Group Award Specification for:

HND in Industrial Biotechnology at SCQF level 8

Group Award Code: GK70 16

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Contents

1 Introduction

This document was previously known as the Arrangements document. The purpose of this document is to:

- assist centres to implement, deliver and manage the qualification
- provide a guide for new staff involved in offering the qualification
- inform course managers, teaching staff, assessors, learners, employers and HEIs of the aims and purpose of the qualification
- provide details of the range of learners the qualification is suitable for and progression opportunities

The overall aim of the HND Industrial Biotechnology Group Award is to provide a progressive, integrated and coherent education which will be responsive to the needs of learners, employers and higher education institutions. The title reflects the content of the Group Award and the diverse range of the industry that learners could progress to. In addition, the title informs employers directly of the target area that the HND Industrial Biotechnology Group Award is designed for.

The HND Industrial Biotechnology Group Award allows learners to gain skills and knowledge in industrial biotechnology and essential skills by providing them with an exposure to each of the main branches of industrial biotechnology: chemistry/biology/process engineering, thus giving them the in-depth knowledge and skills necessary for employment or further articulation to degree programmes in relevant subject areas.

Qualifications Design Teams (QDT) were created to support the development process in consultation with employers, higher education colleagues and further education partners. In designing the Group Award, the QDT has been fully aware of the need for the Group Award to contain relevant technical and transferable skills to enable immediate entry to employment while at the same time allowing articulation to degree courses. The QDT believes that an appropriate balance between academic and vocational knowledge and skills has been achieved throughout the mix of Unit content and potential teaching approaches.

The HND Industrial Biotechnology Group Award is designed for both full and part-time learners and the target audience is those who wish to progress to further study at degree level or to take up a career in the industrial biotechnology industry.

The theoretical content may be delivered by open and distance learning methods, provided that adequate preparations are made. Additional planning and resources will be needed for learner support and assessment. Quality assurance procedures must also be sufficient and robust to support open and distance learning.

The HND Industrial Biotechnology Group Award links to the HNC Applied Sciences Group Award, and it is possible to complete the HNC Applied Sciences Group Award first and then articulate to the HND Industrial Biotechnology Group Award, if the appropriate optional Units have been selected.

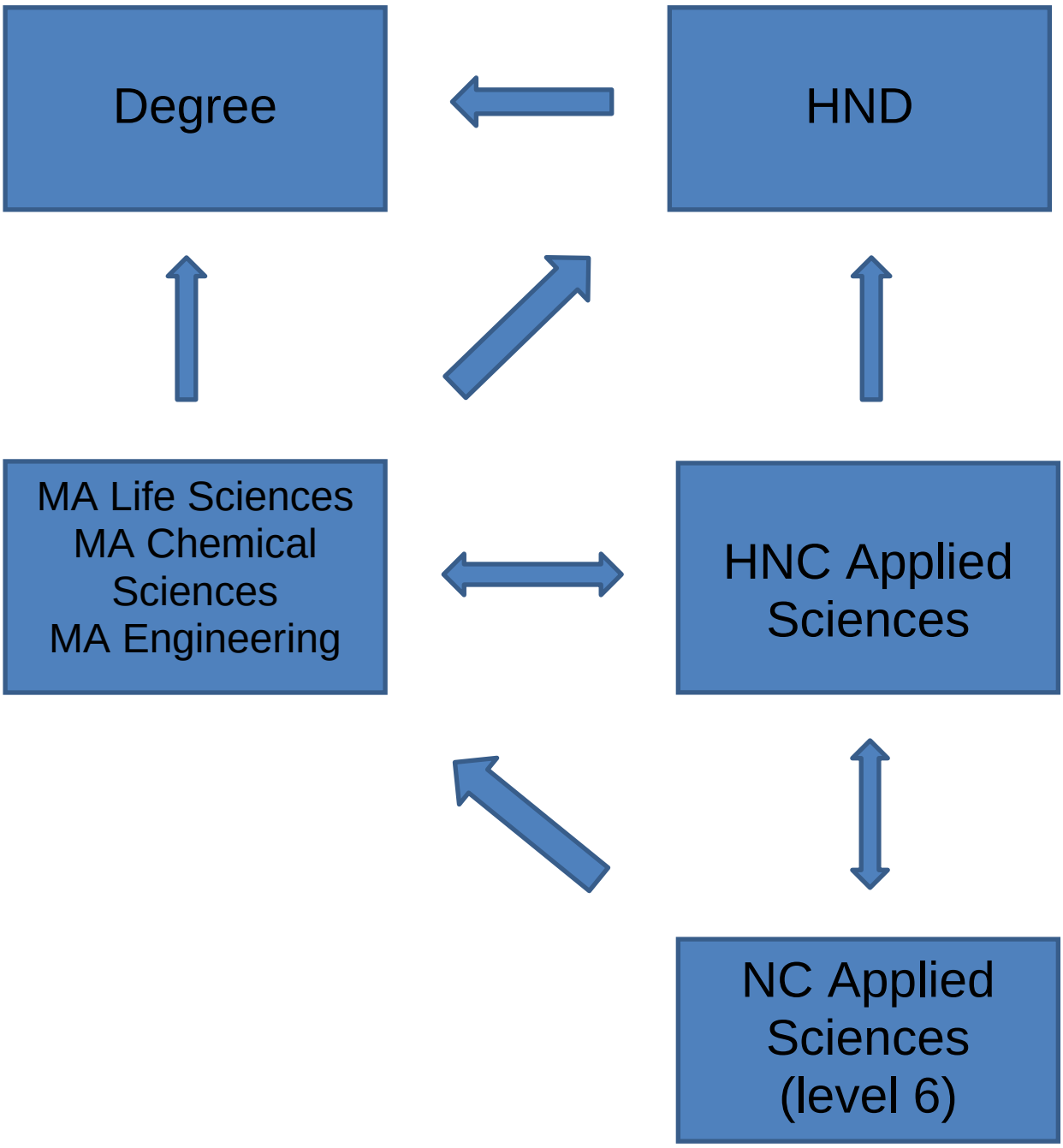
The HND Industrial Biotechnology Group Award is designed as a discrete, specialised qualification to equip learners with the knowledge, skills and understanding required for employment or progression to further academic study, and may be seen to be supporting the national strategies and drivers as outlined below.

The Scottish Life Sciences Strategy states that ‘the Life Sciences industry in Scotland is recognised by both UK and Scottish Governments as one with high growth potential and the capacity to contribute significantly to the nation’s productivity. Scotland hosts the UK’s second largest Life Sciences cluster and one of the most sizeable in Europe. The sector contributes some £1.5 bn of GVA a year and turnover worth £3.1 bn to the Scottish economy.’ The provision of this new Group Award will help to meet the needs of industry.

The Wood Commission Report emphasised that ‘moving beyond school, we must ensure that young people at college pursue studies with an expectation that they will lead successfully to employment in the prevailing labour market. The newly formed regional colleges, through more focused and ambitious outcome agreements, and working closely with industry, should ensure that a college education provides skills and qualifications relevant to the market requirements and in particular the new challenges of the modern technology orientated economy.’ And that ‘as they move into the senior phase, young people of all abilities should have the opportunity to follow industry relevant vocational pathways alongside academic studies.’

The development has allowed the HND Industrial Biotechnology Group Award to take into account changes that have taken place due to the introduction of Curriculum for Excellence, inclusion of updated technical data, revised assessment strategies, flexibility to meet the needs of industry and recognition of the needs of learners for progression to higher education.

The interrelationship of the HND Industrial Biotechnology Group Award with other qualifications is illustrated by the diagram below:



Possible employment opportunities at technician or professional level are likely to come from industries within Scotland and the UK in Industrial Biotechnology, Life Sciences and Chemical Sciences. Examples of employers who would find the HND Industrial Biotechnology Group Award of value are Cells United, Cellucomp, Celtic Renewables, Croda, Diageo, Fujifilm Diosynth, GSK, Ingenza, MBL and Unilever.

2 Qualification structure

Mandatory Units (22 credits)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
H91W	34	Applied Sciences: Graded Unit 1	7	8	1
H91V	34	Laboratory Skills for Science Industries	7	16	2
H996	35	Industrial Biotechnology: Graded Unit 2	8	16	2
J5R2*	35	Instrumental Techniques 1	8	8	1
H92G	34	Microbiology: Theory and Laboratory Skills	7	16	2
H926	34	Biotechnology: An Introduction	7	8	1
H933	34	Organic Chemistry: Theory and Laboratory Skills	7	8	1
H92X	34	Fundamental Chemistry: Theory and Laboratory Skills	7	16	2
J2RE*	34	Cell Biology: Theory and Laboratory Skills	7	8	1
H92N	35	Aromatic Chemistry: Theory and Laboratory Skills	8	8	1
H92P	35	Base-Catalysed and Organometallic Chemistry: Theory and Laboratory Skills	8	8	1
H8XP	33	Mathematics for Science 1	6	8	1
H920	34	Animal and Plant Cell Culture: An Introduction	7	8	1
J2RF*	34	DNA and Genetics	7	8	1
J2GM*	35	Microbiological Techniques	8	16	2
H92J	35	Protein Structure and Function	8	8	1
H97N	34	Chemical Engineering: Principles	7	8	1

Optional Section A (3-8 credits)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
H97L	34	Chemical Engineering: Applied Physical Chemistry	7	8	1
H936	34	Physical Chemistry: Theory and Laboratory Skills	7	8	1
H92Y	34	Inorganic Chemistry: Theory and Laboratory Skills	7	8	1

Optional Section A (cont)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
H8XR	34	Mathematics for Science 2	7	8	1
H92A	35	DNA Molecular Techniques	8	16	2
H922	34	Biochemistry: Theory and Laboratory Skills	7	8	1
H97M	34	Fermentation Engineering	7	8	1
H928	35	Cellular Signalling	8	8	1
H97R	35	Process Operations: Distillation	8	8	1
H97T	34	Heat Transfer Theory and Laboratory Skills	7	8	1
H97P	34	Industrial Biotechnology: Processing	7	8	1
D75X	34	Information Technology: Application Software 1	7	8	1
H91T	34	Applied Biochemical Techniques	7	8	1
H8XT	33	Statistics for Science 1	6	8	1
H8XV	34	Statistics for Science 2	7	8	1
H92H	35	Plant Biology	8	8	1
H931	35	Instrumental Techniques 2	8	8	1
H92K	34	Science Industry: Key Issues	7	8	1
H7K2	34	Engineering Mathematics 3	7	8	1
H7K3	35	Engineering Mathematics 4	8	8	1
H92C	35	Human Body Structure and Function	8	16	2
H92E	35*	Immunological Techniques	8	8	1
H92D	35*	Human Metabolism	8	16	2
J4RC	34	Environmental Awareness	7	8	1
DF82	34	Quality and Health & Safety Systems in Science Industries	7	8	1

Optional Section B (0-1 credit)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
H92W	33	Fundamental Chemistry: An Introduction	6	8	1
H923	33	Biology: An Introduction	6	8	1

Optional Section C (0-4 credits)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
D77H	34	Employment Experience 2	7	8	1
DG6E	34	Work Role Effectiveness	7	24	3
DG6G	35	Work Role Effectiveness	8	24	3
DE3R	34	Personal Development Planning	7	8	1
H8T2	33	Workplace Communication in English	6	8	1

*Refer to History of Changes for revision changes

This Group Award is made up of 240 SCQF credit points (30 SQA Unit credits). 176 SCQF credit points are required to be achieved from the mandatory section. A further 64 SCQF credit points are required from the optional Sections A−C.

SCQF level 6 Units are included in the framework, and they are aimed at learners with little or no subject knowledge and should be used as a building Unit to allow achievement of the mandatory SCQF level 7 Unit.

The *Applied Sciences: Graded Unit 1* is an investigative report. The purpose of the *Applied Sciences: Graded Unit 1* is to assess the learner's ability to integrate and apply the knowledge and skills gained in the individual Units in order to demonstrate that they have achieved the specific aims of the Group Award and to grade learner achievement.

The *Industrial Biotechnology: Graded Unit 2* is a laboratory and/or work based project, with an associated report. The purpose of the *Industrial Biotechnology: Graded Unit 2* is to assess the learner's abilities in integrating and applying knowledge and skills, and to also develop high level advanced and independent practical skills.

HNC Applied Sciences Framework *(Units in italics are available as core or optional Units in HND Industrial Biotechnology)*

Mandatory Units (5 credits)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
H91W	34	*Applied Sciences: Graded Unit 1*	7	8	1
H91V	34	*Laboratory Skills for Science Industries*	7	16	2
H92X	34	*Fundamental Chemistry: Theory and Laboratory Skills*	7	16	2

Mandatory Units (1−2 credits)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
H8XP	33	*Mathematics for Science 1*	6	8	1
H8XT	33	*Statistics for Science 1*	6	8	1

Mandatory Units (1−4 credits)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
J2RE*	34	*Cell Biology: Theory and Laboratory Skills*	7	8	1
J5RT*	34	Physics for Life Sciences	7	8	1
J5RV*	34	Physics 2	7	8	1
H922	34	*Biochemistry: Theory and Laboratory Skills*	7	8	1

Depending on the number of credits achieved in the Mandatory sections above, learners must complete 1−5 credits from optional sections A−D.

Optional Section A — Level 6 Units (0−1 credit)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
H92W	33	*Fundamental Chemistry: An Introduction*	6	8	1
H923	33	*Biology: An Introduction*	6	8	1
H93D	33	Physics 1	6	8	1

Optional Section B (0−5 credits)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
H92Y	34	*Inorganic Chemistry: Theory and Laboratory Skills*	7	8	1
H933	34	*Organic Chemistry: Theory and Laboratory Skills*	7	8	1
H936	34	*Physical Chemistry: Theory and Laboratory Skills*	7	8	1
H92G	34	*Microbiology: Theory and Laboratory Skills*	7	16	2
H922	34	*Biochemistry: Theory and Laboratory Skills*	7	8	1
J5RT*	34	Physics for Life Sciences	7	8	1
J2RF*	34	*DNA and Genetics*	7	8	1
J2RE*	34	*Cell Biology: Theory and Laboratory Skills*	7	8	1
H93A	34	Ecology and Ecosystems	7	8	1
D75X	34	*Information Technology: Applications Software 1*	7	8	1
H920	34	*Animal and Plant Cell Culture: An Introduction*	7	8	1
H91T	34	*Applied Biochemical Techniques*	7	8	1
J4RC	34	*Environmental Awareness*	7	8	1
J5RV*	34	Physics 2	7	8	1
H93G	34	Physics Principles: Heat and Thermodynamics	7	8	1
H93H	34	Physics Principles: Mechanics	7	8	1
H93L	34	Electricity and Magnetism	7	8	1

Optional Section B (cont)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
DN36	34	Earth Science	7	8	1
DN38	34	Sustainable Development	7	8	1
H92K	34	*Science Industry: Key Issues*	7	8	1
H926	34	*Biotechnology: An Introduction*	7	8	1
DF82	34	*Quality and Health & Safety Systems in Science Industries*	7	8	1

Optional Section C (0−3 credits)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
J5R2*	35	*Instrumental Techniques 1*	8	8	1
H937	35	Spectroscopic and Analytical Techniques	8	8	1
H921	35	Animal Biology	8	8	1
H92H	35	*Plant Biology*	8	8	1
H93J	35	Physics: Light and Optics	8	8	1
H93M	35	Electronics	8	8	1
H93K	35	Relativity and Quantum Mechanics	8	8	1
H934	35	Organic Stereochemistry: Theory and Laboratory Skills	8	8	1
H92C	35	*Human Body Structure and Function*	8	16	2
DT4X	35	Environmental Sampling and Analysis	8	8	1
H92V	35	Environmental Chemistry: Theory and Laboratory Skills	8	8	1
H92R	35	Chemistry: Laboratory Practical Skills	8	8	1
H92J	35	*Protein Structure and Function*	8	8	1
H939	35	Transition Metal Chemistry: Theory and Laboratory Skills	8	8	1
H938	35	Thermodynamics and Kinetics: Theory and Laboratory Skills	8	8	1
H92M	35	Applications of Transition Metal Compounds	8	8	1
H92N	35	*Aromatic Chemistry: Theory and Laboratory Skills*	8	8	1
H92P	35	*Base-Catalysed and Organometallic Chemistry: Theory and Laboratory Skills*	8	8	1
H92T	35	Electrochemistry	8	8	1
H931	35	*Instrumental Techniques 2*	8	8	1
H932	35	Main Group Inorganic Chemistry	8	8	1
H935	35	Phase Equilibrium and Surface Chemistry	8	8	1
H92A	35	*DNA Molecular Techniques*	8	16	2

Optional Section C (cont)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
H92E	35	*Immunological Techniques*	8	8	1
J2GM*	35	*Microbiological Techniques*	8	16	2

Optional Section D — Broadening Units (0−2 credits)

Code		Unit title	SCQF level	SCQF credit points	SQA credit
DE3R	34	*Personal Development Planning*	7	8	1
D77H	34	*Employment Experience 2*	7	8	1

*Refer to History of Changes for revision changes

3 Aims of the qualification

The overall aim of the HND Industrial Biotechnology Group Award is to provide a progressive, integrated and coherent education which will be responsive to the needs of learners, employers and higher education institutions.

3.1 General aims of the qualification

The general aims of the HND Industrial Biotechnology Group Award are to develop:

- knowledge of study, research and analysis
- ability to define and solve problems
- transferable skills
- ability to be flexible and work co-operatively with others
- responsibility for own learning
- planning, organisation and review/evaluation skills
- oral and written scientific communication skills
- numerical and ICT skills
- employability skills
- flexibility, knowledge, skills and motivation as a basis for progression to further study within Higher National qualifications and/or graduate studies.

3.2 Specific aims of the qualification

The specific aims of the HND Industrial Biotechnology Group Award specify the knowledge and skills required in order to be deemed competent in this subject/occupational area.

The specific aims of the HND Industrial Biotechnology Group Award are to:

- Prepare learners for an appropriate level of employment, in areas of industrial biotechnology such as research and industrial laboratories; chemical, biofuels, pharmaceutical, food and agriculture production and environmental science.

- Develop a range of contemporary vocational skills relating to the use, support and development of systems appropriate to employment at technician or professional level.
- Provide learners with a range of skills to support learning in relevant SVQ 4 level programmes.
- Provide learners with an element of vocational specialisation in a variety of areas such as biotechnology, chemical, therapeutics, food, agriculture, energy and environmental.
- Prepare learners for progression to further studies in industrial biotechnology related disciplines.
- Provide a flexible route to the Group Award, allowing access to those in employment through part-time study and full-time provision.
- Provide a wider range of practical laboratory skills to enhance job prospects through the practical content of the course. These skills should be at SCQF level 8.
- Provide an opportunity for learners to discover which areas of industrial biotechnology most interests them by providing them with an exposure to each of the main branches of industrial biotechnology which is diverse and varied.

3.3 Graded Units

The purpose of the Graded Units is to assess the learner's ability to integrate and apply the knowledge and skills gained in individual Units to demonstrate that they have achieved the specific aims.

Learners will undertake a one credit Graded Unit at SCQF level 7 and a two credit Graded Unit at SCQF level 8.

The *Applied Sciences: Graded Unit 1* at SCQF level 7 will take the form of an investigation report. It will cover a range of skills achieved through studying the mandatory Units within the Group Award. It allows learners to use research skills, set timescales, identify main issues, methods and sources of research and develop scientific reporting skills.

Learners will be required to produce a report covering planning, development and evaluation of the investigation.

The investigation allows learners to integrate knowledge and skills gained in the mandatory Units and to maximise such opportunities delivery of the *Applied Sciences: Graded Unit 1* should take place during the latter stages of the Group Award.

The *Applied Sciences: Graded Unit 1* is designed to provide evidence that the learner has achieved the following principal aims of the HND Industrial Biotechnology Group Award:

- Develop learners' knowledge and skills such as planning, developing and evaluating.
- Develop employment skills and enhance learners' employment prospects.
- Enable progression within the Scottish Credit and Qualifications Framework (SCQF).
- Develop transferable skills including Core Skills.
- Prepare for employment in an industrial biotechnology related post at technician or professional level.
- Develop a range of vocational skills appropriate to employment at technician or professional level in the science sector.

The *Industrial Biotechnology: Graded Unit 2* at SCQF level 8 will take the form of a laboratory and/or work based project with an associated investigation report. It allows learners to use research skills, set timescales, identify main issues, methods and sources of research and develop scientific reporting skills.

Learners will be required to produce a laboratory report covering planning, development and evaluation of the investigation.

The *Industrial Biotechnology: Graded Unit 2* is designed to provide evidence that the learner has achieved the following principal aims of the HND Industrial Biotechnology Group Award:

- Prepare learners for an appropriate level of employment.
- Develop a range of contemporary vocational skills including investigative skills, health and safety skills in a practical environment and enhanced risk assessment skills.
- Prepare learners for progression to further studies.
- Provide learners with a wider range of practical laboratory skills.
- Develop study and research skills.
- Develop Core Skills such as working with others in a team environment and enhancing communication skills through the use of report writing and working in a laboratory environment.

The *Industrial Biotechnology: Graded Unit 2* will utilise a range of skills achieved through studying the mandatory Units of the Group Award, including practical laboratory skills, but also Good Laboratory Practice (GLP), risk assessments and other aspects of health and safety. To maximise such opportunities delivery of the *Industrial Biotechnology: Graded Unit 2* should take place during the latter stages of the Group Award. Furthermore it allows learners to extend investigative skills from the *Applied Sciences: Graded Unit 1* into a practical situation, and it allows learners to use laboratory reporting skills by producing a logbook/diary of their activities as well as the final investigation report.

In addition, learners will develop a variety of supplementary skills which enhance life skills and the educational experience. These skills are associated with enterprise, employability, sustainability and citizenship.

4 Recommended entry to the qualification

Entry to this qualification is at the discretion of the centre. The following information on prior knowledge, skills, experience or qualifications that provide suitable preparation for this qualification has been provided by the QDT as guidance only.

Learners would benefit from having attained the skills, knowledge and understanding required by one or more of the following or equivalent qualifications and/or experience:

- A minimum of Chemistry or Biology at Grade C or above Higher level, and one other Higher with appropriate supporting qualifications at National 5 level (or equivalent) in relevant science and mathematics subjects.
- NC Applied Sciences level 6.
- Qualifications in appropriate science and mathematics programmes, such as Access programmes. Learners should have gained some Units at Higher level in appropriate science.
- Suitable work experience gained in a science laboratory.

It is intended that admission to the HND Industrial Biotechnology Group Award should be as broadly based as possible, but that this should be consistent with the selection of learners who have the appropriate knowledge and skills to successfully achieve the HND Industrial Biotechnology Group Award.

Achieving the HNC Applied Sciences Group Award (with 15 credits) would allow entry direct to second year of the HND Industrial Biotechnology Group Award, providing that learners had undertaken the correct optional Units to allow articulation.

4.1 Core Skills entry profile

The Core Skills entry profile provides a summary of the associated assessment activities that exemplify why a particular level has been recommended for this Group Award.

Whilst learners will naturally use and develop aspects of all five Core Skills as they work through the Units making up the Group Award, the information below should be used to identify if additional learning support needs to be put in place. This may be necessary for learners whose Core Skills profile is below the recommended entry level or where learners need to undertake supporting Units in order to develop one (or more) particular Core Skills. Indeed, it may help identify whether learners should be encouraged to do an alternative level or learning programme.

It should be noted that although there is no mandatory entry and exit levels the following is recommended:

Core Skill	Recommended SCQF entry profile	Associated assessment activities
Communication	SCQF level 5	Research, analysis, reports, oral presentation.
Numeracy	SCQF level 5	Numerical and graphical presentation, numerical and algebraic calculations.
Information and Communication Technology (ICT)	SCQF level 5	Accessing information for research purposes, assimilation and analysis of research information, creation of graphical and narrative material for report and presentation purposes.
Problem Solving	SCQF level 5	Critical thinking, planning and evaluation.
Working with Others	SCQF level 4	Co-operative working as part of a team for practical activities.

5 Additional benefits of the qualification in meeting employer needs

This qualification was designed to meet a specific purpose and what follows are details on how that purpose has been met through mapping of the Units to the aims of the qualification. Through meeting the aims, additional value has been achieved by linking the Unit standards with those defined in National Occupational Standards and/or trade/professional body requirements. In addition, significant opportunities exist for learners to develop the more generic skills, known as Core Skills, through doing this qualification.

5.1 Mapping of qualification aims to Units

Code	Unit title	General Aims									
		1	2	3	4	5	6	7	8	9	10
H91W 34	Applied Sciences: Graded Unit 1	X	X	X		X	X	X	X	X	X
H91V 34	Laboratory Skills for Science Industries	X	X	X	X	X	X	X	X	X	X
H996 35	Industrial Biotechnology: Graded Unit 2	X	X	X	X	X	X	X	X	X	X
J5R2 35*	Instrumental Techniques 1	X	X	X	X	X	X	X	X	X	X
H92G 34	Microbiology: Theory and Laboratory Skills	X	X	X	X	X	X	X	X	X	X
H926 34	Biotechnology: An Introduction	X	X	X	X	X	X	X	X	X	X
H933 34	Organic Chemistry: Theory and Laboratory Skills	X	X	X	X	X	X	X	X	X	X
H92X 34	Fundamental Chemistry: Theory and Laboratory Skills	X	X	X	X	X	X	X	X	X	X
J2RE 34	Cell Biology: Theory and Laboratory Skills	X	X	X	X	X	X	X	X	X	X
H92N 35	Aromatic Chemistry: Theory and Laboratory Skills	X	X	X	X	X	X	X	X	X	X
H92P 35	Base-Catalysed and Organometallic Chemistry: Theory and Laboratory Skills	X	X	X	X	X	X	X	X	X	X
H8XP 33	Mathematics for Science 1	X	X	X		X	X		X	X	X
H920 34	Animal and Plant Cell Culture: An Introduction	X	X	X	X	X	X	X	X	X	X
J2RF 34	DNA and Genetics	X	X	X	X	X	X	X	X	X	X
J2GM 35	Microbiological Techniques	X	X	X	X	X	X	X	X	X	X
H92J 35	Protein Structure and Function	X	X	X		X	X	X	X	X	X
H97N 34	Chemical Engineering: Principles	X	X	X		X			X	X	X

Code	Unit title	General Aims									
		1	2	3	4	5	6	7	8	9	10
H97L 34	Chemical Engineering: Applied Physical Chemistry	X	X	X		X			X	X	X
H936 34	Physical Chemistry: Theory and Laboratory Skills	X	X	X	X	X	X	X	X	X	X
H92Y 34	Inorganic Chemistry: Theory and Laboratory Skills	X	X	X	X	X	X	X	X	X	X
H8XR 34	Mathematics for Science 2	X	X	X		X	X		X	X	X
H92A 35	DNA Molecular Techniques	X	X	X	X	X	X	X	X	X	X
H922 34	Biochemistry: Theory and Laboratory Skills	X	X	X	X	X	X	X	X	X	X
H97M 34	Fermentation Engineering	X	X	X		X	X		X	X	X
H928 35	Cellular Signalling	X	X	X		X	X	X	X	X	X
H97R 35	Process Operations: Distillation	X	X	X	X	X	X	X	X	X	X
H97T 34	Heat Transfer Theory and Laboratory Skills	X	X	X	X	X	X	X	X	X	X
H97P 34	Industrial Biotechnology: Processing	X	X	X		X	X	X	X	X	X
D75X 34	Information Technology: Applications Software 1		X	X		X	X		X	X	X
H91T 34	Applied Biochemical Techniques	X	X	X	X	X	X	X	X	X	X
H8XT 33	Statistics for Science 1	X	X	X		X	X		X	X	X
H8XV 34	Statistics for Science 2	X	X	X		X	X		X	X	X
H92H 35	Plant Biology	X	X	X	X	X	X	X	X	X	X
H931 35	Instrumental Techniques 2	X	X	X	X	X	X	X	X	X	X
H92K 34	Science Industry: Key Issues	X	X	X	X	X	X	X	X	X	X
H7K2 34	Engineering Mathematics 3	X	X	X		X	X		X	X	X
H7K3 35	Engineering Mathematics 4	X	X	X		X	X		X	X	X

Code	Unit title	General Aims									
		1	2	3	4	5	6	7	8	9	10
H92C 35	Human Body Structure and Function	X	X	X	X	X	X	X	X	X	X
H92E 35	Immunological Techniques	X	X	X	X	X	X	X	X	X	X
H92D 35	Human Metabolism	X	X	X	X	X	X	X	X	X	X
J4RC 34	Environmental Awareness	X	X	X	X	X	X	X	X	X	X
DF82 34	Quality and Health & Safety Systems in Science Industries	X	X	X		X	X	X	X	X	X
H92W 33	Fundamental Chemistry: An Introduction	X	X	X	X	X	X	X	X	X	X
H923 33	Biology: An Introduction	X	X	X	X	X	X	X	X	X	X
D77H 34	Employment Experience 2		X	X	X	X	X	X	X	X	X
DG6E 34	Work Role Effectiveness	X	X	X	X	X	X	X	X	X	X
DG6G 35	Work Role Effectiveness	X	X	X	X	X	X	X	X	X	X
DE3R 34	Personal Development Planning		X	X		X	X		X	X	X
H8T2 33	Workplace Communication in English	X		X	X	X	X	X	X	X	X

5.2 Mapping of National Occupational Standards (NOS)

The HND Industrial Biotechnology Group Award has been mapped against the level 4 SVQ Life Sciences and Related Industries.

Code	National Occupational Standard	Laboratory Skills for Science Industries (H91V 34)	Fundamental Chemistry: Theory and Laboratory Skills (H92X 34)	Instrumental Techniques 1 (J5R2 35*)	Microbiology: Theory and Laboratory Skills (H92G 34)	Biotechnology: An Introduction (H926 34)	Organic Chemistry: Theory and Laboratory Skills (H933 34)	Cell Biology: Theory and Laboratory Skills (J2RE 34)	Mathematics for Science 1 (H8XP 33)	Aromatic Chemistry: Theory and Laboratory Skills (H92N 35)	Base-Catalysed and Organometallic Chemistry: Theory and Laboratory Skills (H92P 35)	Animal and Plant Cell Culture: An Introduction (H920 34)	DNA and Genetics (J2RF 34)	Microbiological Techniques (J2GM 35)	Protein Structure and Function(H92J 35)	Chemical Engineering: Principles (H97N 34)
H6F2 04	Maintain Effective and Efficient Working Relationships	X	X	X	X	X	X	X		X	X	X		X		
H6FC 04	Preparing Reagents	X		X			X			X	X	X		X		
H6FK 04	Provide Technical Support for Computer Application Software and Equipment															
H6FN 04	Provide Technical Advice and Guidance															
H6FP 04	Prepare New Methods, Resources and Equipment for Learning Activities															
H6FR 04	Improve the Quality and Reliability of Activities															
H6FV 04	Amplifying and Analysing DNA or RNA Samples using PCR or qPCR	X												X		
H6FW 04	Analysing Samples using Light Microscopy	X	X		X	X		X						X		

Code	National Occupational Standard	Laboratory Skills for Science Industries (H91V 34)	Fundamental Chemistry: Theory and Laboratory Skills (H92X 34)	Instrumental Techniques 1 (J5R2 35*)	Microbiology: Theory and Laboratory Skills (H92G 34)	Biotechnology: An Introduction (H926 34)	Organic Chemistry: Theory and Laboratory Skills (H933 34)	Cell Biology: Theory and Laboratory Skills (J2RE 34)	Mathematics for Science 1 (H8XP 33)	Aromatic Chemistry: Theory and Laboratory Skills (H92N 35)	Base-Catalysed and Organometallic Chemistry: Theory and Laboratory Skills (H92P 35)	Animal and Plant Cell Culture: An Introduction (H920 34)	DNA and Genetics (J2RF 34)	Microbiological Techniques (J2GM 35)	Protein Structure and Function(H92J 35)	Chemical Engineering: Principles (H97N 34)
H6FY 04	Analysis of DNA using Gel Electrophoresis	X		X												
H6G0 04	Plan and Collect Samples for Testing															
H6G1 04	Carry out Investigation	X	X	X	X	X	X	X		X	X	X		X		
H6G2 04	Analysis of Samples using High Performance Liquid Chromatography	X		X												
H6G3 04	Analysis of Samples using Spectroscopy	X		X												
H6G4 04	Analysis of Samples using Gas Chromatography	X	X	X												
H6G5 04	Applying Basic Statistics															
H6G6 04	Develop and Provide Training															
H6G7 04	Culturing or Fermenting Cells											X				
H6G8 04	Develop and Maintain Health and Safety Procedures	X														
H6G9 04	Make Presentations in the Work Place	X														
H6GA 04	Managing Budgets															
H6GB 04	Providing Leadership															

Code	National Occupational Standard	Laboratory Skills for Science Industries (H91V 34)	Fundamental Chemistry: Theory and Laboratory Skills (H92X 34)	Instrumental Techniques 1 (J5R2 35*)	Microbiology: Theory and Laboratory Skills (H92G 34)	Biotechnology: An Introduction (H926 34)	Organic Chemistry: Theory and Laboratory Skills (H933 34)	Cell Biology: Theory and Laboratory Skills (J2RE 34)	Mathematics for Science 1 (H8XP 33)	Aromatic Chemistry: Theory and Laboratory Skills (H92N 35)	Base-Catalysed and Organometallic Chemistry: Theory and Laboratory Skills (H92P 35)	Animal and Plant Cell Culture: An Introduction (H920 34)	DNA and Genetics (J2RF 34)	Microbiological Techniques (J2GM 35)	Protein Structure and Function(H92J 35)	Chemical Engineering: Principles (H97N 34)
H6GC 04	Encourage Problem Solving and Innovation															
H6GD 04	Establish and Implement Quality Assurance Processes															

5.3 Mapping of Core Skills development opportunities across the qualification

Unit code	Unit title	Communication		Numeracy		ICT		Problem Solving			Working with Others	
		Written	Oral	Using Number	Using Graphical Information	Accessing Information	Providing/Creating Information	Critical Thinking	Planning and Organising	Reviewing and Evaluating	Working Co-operatively with Others	Reviewing Co-operative Contribution
H91W 34	Applied Sciences: Graded Unit 1	S	S	S	S	S	S	E	E	E		
H91V 34	Laboratory Skills for Science Industries	O	O	S	E	O	S	E	O	S	O	O
H996 35	Industrial Biotechnology: Graded Unit 2	S	O	O	S	O	S	E	E	E	O	O
J5R2 35*	Instrumental Techniques 1	O		O	O	O	S	O	O	S	O	O
H92G 34	Microbiology: Theory and Laboratory Skills	O		S			S	O	O	S	O	O
H926 34	Biotechnology: An Introduction	O		O	O	O	S	O	O	S	O	O
H933 34	Organic Chemistry: Theory and Laboratory Skills	O		O	O	O	S	O	O	S	O	O
H92X 34	Fundamental Chemistry: Theory and Laboratory Skills	O		S	O	O	S	O	O	S	O	O
J2RE 34	Cell Biology: Theory and Laboratory Skills	O		S			S	O	O	O	O	O
H92N 35	Aromatic Chemistry: Theory and Laboratory Skills	O		O	O	O	S	O	O	S	O	O
H92P 35	Base-Catalysed and Organometallic Chemistry: Theory and Laboratory Skills	O		O	O	O	S	O	O	S	O	O
H8XP 33	Mathematics for Science 1			O	E			O	O	O		

Unit code	Unit title	Communication		Numeracy		ICT		Problem Solving			Working with Others	
		Written	Oral	Using Number	Using Graphical Information	Accessing Information	Providing/Creating Information	Critical Thinking	Planning and Organising	Reviewing and Evaluating	Working Co-operatively with Others	Reviewing Co-operative Contribution
H920 34	Animal and Plant Cell Culture: An Introduction	O					S	O	O	S	O	O
J2RF 34	DNA and Genetics	O		S			S	O	O	O	O	O
J2GM 35	Microbiological Techniques	O		S			S	O	O	S	O	O
H92J 35	Protein Structure and Function	O		S	O	O	S	S	O	O	O	O
H97N 34	Chemical Engineering: Principles			S	S			S	O	O		
H97L 34	Chemical Engineering: Applied Physical Chemistry			S	S			S	O	O		
H936 34	Physical Chemistry: Theory and Laboratory Skills			E		O	S	O	O	S		
H92Y 34	Inorganic Chemistry: Theory and Laboratory Skills			E		O	S	O	O	S		
H8XR 34	Mathematics for Science 2			E	O			E	O	O		
H92A 35	DNA Molecular Techniques	O		S			S	O	O	S	O	O
H922 34	Biochemistry: Theory and Laboratory Skills	O		S	O	O	S	O	O	S	O	O
H97M 34	Fermentation Engineering			S	O			S	O	O		
H928 35	Cellular Signalling	O		S	S	O		S	S	S		
H97R 35	Process Operations: Distillation	S		S	S	O	O	S	O	O	O	O

Unit code	Unit title	Communication		Numeracy		ICT		Problem Solving			Working with Others	
		Written	Oral	Using Number	Using Graphical Information	Accessing Information	Providing/Creating Information	Critical Thinking	Planning and Organising	Reviewing and Evaluating	Working Co-operatively with Others	Reviewing Co-operative Contribution
H97T 34	Heat Transfer Theory and Laboratory Skills	S		S	S	O	O	S	O	O	S	O
H97P 34	Industrial Biotechnology: Processing	O	O	S	S	O	S	S	O	O		
D75X 34	Information Technology: Applications Software 1					E	E	O	O	O		
H91T 34	Applied Biochemical Techniques	S	S	S	S		S	O	O	S	S	S
H8XT 33	Statistics for Science 1			O	E	O	O	O	O	O		
H8XV 34	Statistics for Science 2			O	O	O	O	O	O	O		
H92H 35	Plant Biology	O		S	O	O	S	O	O	S	O	O
H931 35	Instrumental Techniques 2	O		S	S	S	S	E	S	S	O	O
H92K 34	Science Industries: Key Issues	O	O			O	O	E	O	O	S	S
H7K2 34	Engineering Mathematics 3			E	O			O	O	O		
H7K3 35	Engineering Mathematics 4			E	O			O	O	O		
H92C 35	Human Body Structure and Function	O		S	O	O	S	O	O	S	O	O
H92E 35	Immunological Techniques	O		S			S	E	O	S	O	O
H92D 35	Human Metabolism			S	O	O	S	E	O	S		
J4RC 34	Environmental Awareness	O	O			O	O	O	O	O		
DF82 34	Quality and Health & Safety Systems in Science Industries	O	O								O	O
H92W 33	Fundamental Chemistry: An Introduction	O		O	O	O	O	S	S	S	O	O

Unit code	Unit title	Communication		Numeracy		ICT		Problem Solving			Working with Others	
		Written	Oral	Using Number	Using Graphical Information	Accessing Information	Providing/Creating Information	Critical Thinking	Planning and Organising	Reviewing and Evaluating	Working Co-operatively with Others	Reviewing Co-operative Contribution
H923 33	Biology: An Introduction	O		S			S	O	O	O	O	O
D77H 34	Employment Experience 2	O	O			O	O	O	O	O	E	E
DG6E 34	Work Role Effectiveness	O	O	O	O	O	O	O	O	O	O	O
DG6G 35	Work Role Effectiveness	O	O	O	O	O	O	O	O	O	O	O
DE3R 34	Personal Development Planning	O	O			O	O	O	O	O		
H8T2 33	Workplace Communication in English	E	E			S	S	S	S	S	S	S

Key:

E = Embedded
S = Signposted
O = Opportunities

5.4 Assessment Strategy for the qualification

In the majority of the Units, theory based Outcomes are assessed holistically by means of an end of Unit closed-book assessment under controlled conditions. Practical Outcomes are evidenced by a variety of means; please consult individual Unit specifications for clarification and details of arrangements. The Units in the following table are notable exceptions.

Unit	Assessment
Laboratory Skills for Science Industries	Outcome 1: Production of Control of Substances Hazardous to Health (COSHH) and risk assessments. Outcome 2: Practical activities and laboratory diaries/pro formas. Outcome 3: Evidence of presenting and analysing scientific information. Outcome 4: Production of laboratory reports/poster/presentation.
Applied Sciences: Graded Unit 1	Assessed by the use of a scientific report. The investigation brief should provide the learner with the opportunity to produce evidence that demonstrates that they have met the aims of the Group Award.
Personal Development Planning	Assessed holistically by means of a personal development portfolio.
Employment Experience 2	Assessed holistically by means of a portfolio of evidence generated at the learner's place of work. Evidence will be produced by the learner during routine tasks but will also include reflective statements of their experience and supporting witness testimony to support the learner performance.
Industrial Biotechnology: Graded Unit 2	Assessed by the undertaking of a laboratory based project and production of associated scientific report. The investigation brief should provide the learner with the opportunity to produce evidence that demonstrates that they have met the aims of the Group Award.
Work Role Effectiveness	Evidence for the Unit will include self-appraisal materials generated by the learner. This will be confirmed or amended by employer comment (or report) and assessed in a professional interview by the assessor for this Unit.
Work Role Effectiveness	Evidence for the Unit will include self-appraisal materials generated by the learner. This will be confirmed or amended by employer comment (or report) and assessed in a professional interview by the assessor for this Unit.
Workplace Communication in English	Outcome 1: Summarising and evaluating a written business text which combines factual content and analysis. Outcome 2: Producing a folio of at least three vocationally relevant documents which present and examine information and ideas. Outcome 3: Taking part in sustained spoken communication which has a clear remit involving a complex vocational issue.
Environmental Awareness	Outcomes 1–4 Can be assessed by an extended response report in which learners provide evidence that they have an understanding of specified environmental issues. The report should include a personal action plan of the connection between their own actions at work, leisure, home and environmental impacts.

6 Guidance on approaches to delivery and assessment

6.1 Sequencing/integration of Units

The structure of the HND Industrial Biotechnology Group Award allows a high degree of flexibility in the mode of delivery. The Group Award can be offered on a full-time, part-time, day-release, block-release basis or as an evening mode of study. A distance learning delivery mode is possible provided adequate materials, tutorial support, assessment facilities and laboratory time exist. Centres should note however that assessed practical activities must take place under supervised conditions. Combination of delivery modes is also a possibility. Such combined modes of study may enable learners to complete the Group Award in a shorter time period.

Centres will define which order the Units are undertaken based on learner recruitment patterns, mode of delivery, resource implications, and logical progression dictated by topic and content.

The Group Award lends itself to a wide range of delivery mechanisms including formal teaching, case studies, group work, tutorial, laboratory/practical work, field work and demonstration/coaching opportunities.

The inclusion of SCQF level 6 Units in chemistry and biology within the HND Industrial Biotechnology Group Award provides an opportunity to support learners who have limited prior knowledge of a particular science. The opportunity to undertake one of these Units should be sequenced at an early stage of delivery.

The *Laboratory Skills for Science Industries* Unit could be integrated and evidence generated from Units throughout the Group Award. It is important to note that the *Laboratory Skills for Science Industries* Unit has been designed so as to give learners the laboratory time necessary to develop essential practical skills, prior to assessment of set practical experiments.

It is expected that the *Applied Sciences: Graded Unit 1* would be undertaken in the first year of the (full-time) programme, and should use knowledge gained from the mandatory Units of this Group Award.

It is expected that the *Industrial Biotechnology: Graded Unit 2* would be undertaken in the second year of the (full time) programme and should use knowledge gained from the mandatory Units of this Group Award. Learners should have attained a high level of practical skills and experience before undertaking the *Industrial Biotechnology: Graded Unit 2*.

6.1.1 Delivery Schedule

There are many driving forces which determine a full-time delivery programme for any Group Award including accommodation, staff availability, materials and equipment.

The following table indicates a suggested delivery programme of Units for a two year full-time delivery programme operating on a two block delivery system.

HND Industrial Biotechnology	
Suggested delivery for a full-time two year programme	
Year 1: Teaching Block 1	**Year 1: Teaching Block 2**
Laboratory Skills for Science Industries	
Mathematics for Science 1	Microbiology: Theory and Laboratory Skills
Cell Biology: Theory and Laboratory Skills	
Fundamental Chemistry: Theory and Laboratory Skills	Organic Chemistry: Theory and Laboratory Skills
Chemical Engineering: Principles	Optional Units
Instrumental Techniques 1	Animal and Plant Cell Culture: An Introduction
DNA and Genetics	Applied Sciences: Graded Unit 1
Year 2: Teaching Block 1	**Year 2: Teaching Block 2**
Aromatic Chemistry: Theory and Laboratory Skills	Base Catalysed Reactions and Organometallic Reagents: Theory and Laboratory Skills
Biotechnology: An Introduction	Protein Structure and Function
Microbiological Techniques	
Optional Units	Optional Units
	Industrial Biotechnology: Graded Unit 2

6.2 Recognition of Prior Learning

SQA recognises that learners gain knowledge and skills acquired through formal, non-formal and informal learning contexts.

In some instances, a full Group Award may be achieved through the recognition of prior learning. However, it is unlikely that a learner would have the appropriate prior learning and experience to meet all the requirements of a full Group Award.

The recognition of prior learning may **not** be used as a method of assessing in the following types of Units and assessments:

- HN Graded Units
- Course and/or external assessments
- Other integrative assessment Units (which may or not be graded)
- Certain types of assessment instruments where the standard may be compromised by not using the same assessment method outlined in the Unit
- Where there is an existing requirement for a licence to practice
- Where there are specific health and safety requirements
- Where there are regulatory, professional or other statutory requirements
- Where otherwise specified in an Assessment Strategy

More information and guidance on the *Recognition of Prior Learning* (RPL) may be found on our website **www.sqa.org.uk**.

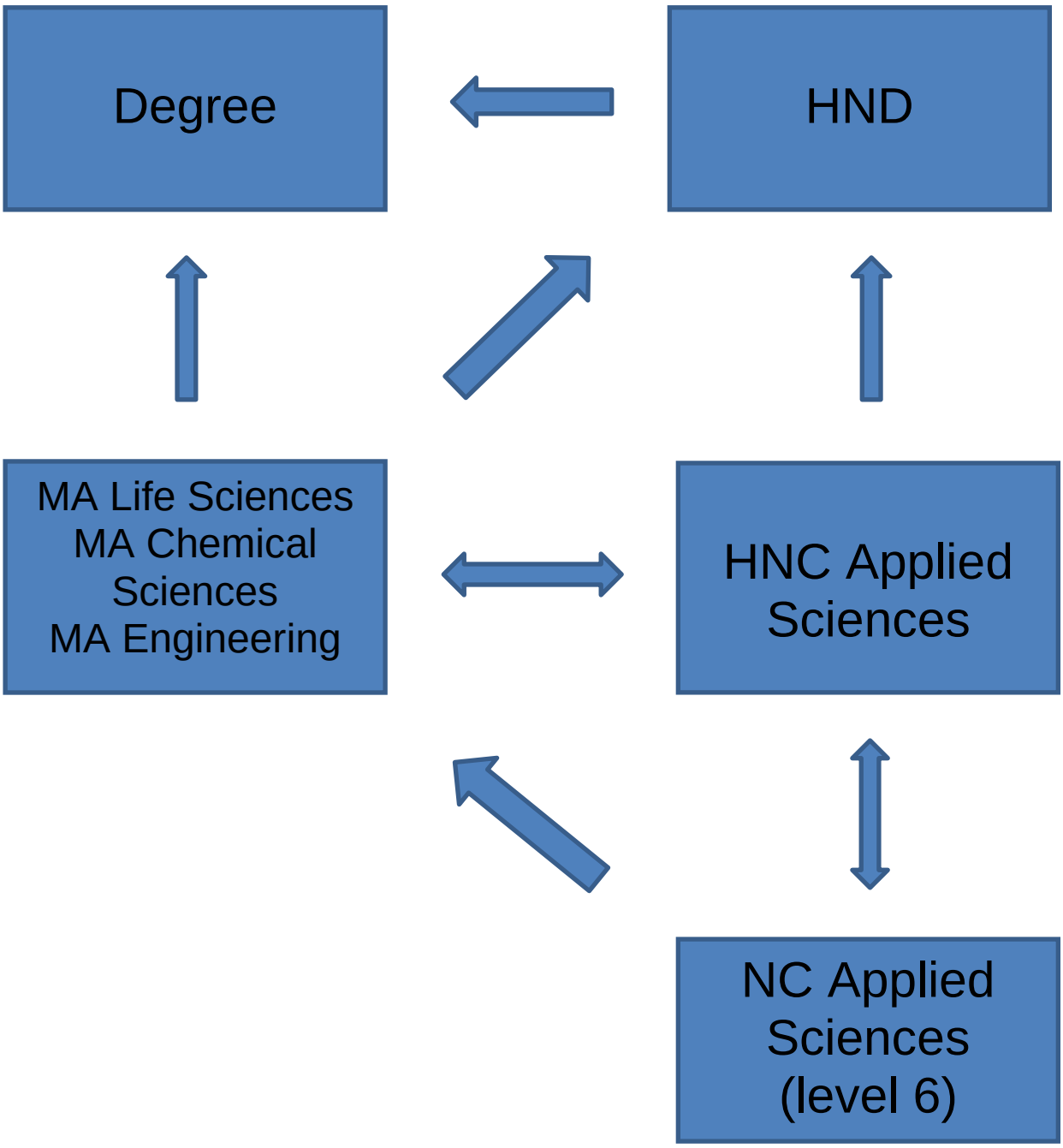
The following sub-sections outline how existing SQA Unit(s) may contribute to this Group Award. Additionally, they also outline how this Group Award may be recognised for professional and articulation purposes.

6.2.1 Articulation and/or progression

The HND Industrial Biotechnology Group Award is designed to allow progression from the HNC Applied Sciences Group Award (if 15 credits are attained) into second year of the HND Industrial Biotechnology Group Award.

The HND Industrial Biotechnology Group Award forms an integral part of the Technical Apprenticeship in Life Sciences and Related Industries at SCQF level 8, providing the knowledge and understanding and basic skills required to allow the development of vocational skills in the work place. Learners on this route will normally attend college on a day-release or block-release basis.

The diagram below illustrates potential progression routes:



6.2.2 Transitional Arrangements

There is no previous Group Award in Industrial Biotechnology, however as the HNC Applied Sciences Group Award has recently been modernised and it may be that learners progress from this Group Award with old Units, credit transfer arrangements are indicated below.

6.2.3 Credit transfer

New Unit Code	New Unit Title	Old Unit Code	Old Unit Title	Direct Credit Transfer	Elements of Credit Transfer
H91W 34	Applied Sciences: Graded Unit 1	DJ89 34	Applied Sciences: Graded Unit 1	Yes	
H91V 34	Laboratory Skills for Science Industries	N/A		No	Pass of Unit DF82 34 credits Outcome 1 Pass of Unit DG70 34 credits Outcome 4
H996 35	Industrial Biotechnology: Graded Unit 2	N/A			
J5R2 35*	Instrumental Techniques 1	H930 35	Instrumental Techniques 1	Yes	
H92G 34	Microbiology: Theory and Laboratory Skills	DH55 34	Microbiology: Theory and Practice	Yes	
H926 34	Biotechnology: An Introduction	DJ00 34	Biotechnology: An Introduction	No	
H933 34	Organic Chemistry: Theory and Laboratory Skills	DP2P 34	Fundamental Concepts of Organic Chemistry	Yes	
H92X 34	Fundamental Chemistry: Theory and Laboratory Skills	DH2K 34	Fundamental Chemistry: Theory and Practice	Yes	
H927 34	Cell Biology: Theory and Laboratory Skills	DJ1K 34	Cell Biology: Theory and Practice	No	
H92N 35	Aromatic Chemistry: Theory and Laboratory Skills	DP54 35	Aromatic Chemistry: Theory and Practice	Yes	
H92P 35	Base-Catalysed and Organometallic Chemistry: Theory and Laboratory Skills	DP5W 35	Base-Catalysed Reactions and Organometallic Reagents in Organic Synthesis	Yes	

New Unit Code	New Unit Title	Old Unit Code	Old Unit Title	Direct Credit Transfer	Elements of Credit Transfer
H8XP 33	Mathematics for Science 1	DN8D 33	Mathematics for Science 1	No	Pass of DN8D 33 credits Outcome 1
H920 34	Animal and Plant Cell Culture: An Introduction	DH2H 34	Animal and Plant Cell Culture: An Introduction	Yes	
H929 34	DNA and Genetics	DJ6Y 34 DP4P 34	DNA Structure and Function Genetics	 No	Both Units, DJ6Y 34 and DP4P 34, required for credit transfer
J2GM 35	Microbiological Techniques	DH2P 35	Microbiological Techniques: Theory and Practice	Yes	
H92J 35	Protein Structure and Function	DG6X 35	Protein Structure and Function	Yes	
H97N 34	Chemical Engineering: Principles	F3X8 34	Chemical Engineering: Principles	Yes	
H97L 34	Chemical Engineering: Applied Physical Chemistry	F3XD 34	Chemical Engineering: Applied Physical Chemistry	Yes	
H936 34	Physical Chemistry: Theory and Laboratory Skills	DP2R 34	Fundamental Concepts of Physical Chemistry	Yes	
H92Y 34	Inorganic Chemistry: Theory and Laboratory Skills	DP2N 34	Fundamental Concepts of Inorganic Chemistry	No	Pass of Unit DP2N 34 credits Outcome 4
H8XR 34	Mathematics for Science 2	DV9V 34	Mathematics for Science 2	No	Pass of DV9V 34 credits Outcome 1
H92A 35	DNA Molecular Techniques	DJ6X 35	DNA Molecular Techniques: Theory and Practice	No	
H922 34	Biochemistry: Theory and Laboratory Skills	DH2J 34	Biochemistry: Theory and Practice	Yes	
H97M 34	Fermentation Engineering	F3XA 34	Fermentation Engineering	Yes	

New Unit Code	New Unit Title	Old Unit Code	Old Unit Title	Direct Credit Transfer	Elements of Credit Transfer
H928 35	Cellular Signalling	DP4T 34	Cellular Signalling	Yes	
H97R 35	Process Operations: Distillation	F3XF 35	Process Operations: Distillation	Yes	
H97T 34	Heat Transfer Theory and Laboratory Skills	F3XC 34	Heat Transfer: Theory and Practice	Yes	
H97P 34	Industrial Biotechnology: Processing	N/A			
D75X 34	Information Technology: Applications Software 1	N/A			
H91T 34	Applied Biochemical Techniques	DG6Y 34	Applied Biochemical Techniques	No	Pass of Unit DG6Y 34 credits Outcomes 2, 3 and 4
H8XT 33	Statistics for Science 1	DN8C 34	Statistics for Science 1	Yes	
H8XV 34	Statistics for Science 2	DV08 35	Statistics for Science 2	Yes	
H92H 35	Plant Biology	DP4M 34	Plant Biology	Yes	
H931 35	Instrumental Techniques 2	DH2N 35	Instrumental Techniques: Theory and Practice 2	Yes	
H92K 34	Science Industry: Key Issues	DP9M 34	Science Industry: Key Issues	Yes	
H7K2 34	Engineering Mathematics 3	N/A			
H7K3 35	Engineering Mathematics 4	N/A			
H92C 35	Human Body Structure and Function	DG71 35	Human Body Structure and Function	Yes	

New Unit Code	New Unit Title	Old Unit Code	Old Unit Title	Direct Credit Transfer	Elements of Credit Transfer
H92E 35	Immunological Techniques	DH2L 35 DH2M 35	Immunological Techniques: Theory and Practice Immunotechnology: Theory and Practice	No	Both Units, DH2L 35 and DH2M 35 required for credit transfer
H92D 35	Human Metabolism	DN39 35	Human Metabolism	Yes	
J4RC 34	Environmental Awareness	F2G8 34	Environmental Awareness	Yes	
DF82 34	Quality and Health & Safety Systems in Science Industries	N/A			
H92W 33	Fundamental Chemistry: An Introduction	DX29 33	Fundamental Chemistry: An Introduction	Yes	
H923 33	Biology: An Introduction	N/A			
D77H 34	Employment Experience 2	N/A			
DG6E 34	Work Role Effectiveness	N/A			
DG6G 35	Work Role Effectiveness	N/A			
DE3R 34	Personal Development Planning	N/A			
H8T2 33	Workplace Communication in English	N/A			

6.3 Opportunities for e-assessment

E-assessment may be appropriate for some assessments in the Units comprising this Group Award. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

6.4 Support materials

A **list of existing ASPs** is available to view on SQA's website.

Understanding Standards documents will be produced for the following Units:

Unit code	Unit title
H91W 34	Applied Sciences: Graded Unit 1
H91V 34	Laboratory Skills for Science Industries

6.5 Resource requirements

Delivering centres will require appropriate science and chemical engineering teaching laboratories and technical support.

Centres will also require appropriate laboratory resources to support the delivery of the practical elements of this Group Award.

All staff delivering the HND Industrial Biotechnology Group Award will be required to hold a qualification appropriate to the Unit delivered.

Centres will require to ensure that specific requirements in terms of documents, texts, and IT resources to support the learning processes within Units are met.

7 General information for centres

Equality and inclusion

The Unit specifications making up this Group Award have been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners will be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

Internal and external verification

All instruments of assessment used within this qualification should be internally verified, using the appropriate policy within the centre and the guidelines set by SQA.

External verification will be carried out by SQA to ensure that internal assessment is within the national guidelines for this qualification.

Further information on internal and external verification can be found in *SQA's Guide to Assessment* **(www.sqa.org.uk/GuideToAssessment)**.

8 Glossary of terms

Embedded Core Skills: is where the assessment evidence for the Unit also includes full evidence for complete Core Skill or Core Skill components. A learner successfully completing the Unit will be automatically certificated for the Core Skill. (This depends on the Unit having been successfully audited and validated for Core Skills certification.)

Finish date: The end of a Group Award's lapsing period is known as the finish date. After the finish date, the Group Award will no longer be live and the following applies:

- learners may not be entered for the Group Award
- the Group Award will continue to exist only as an archive record on the Awards Processing System (APS)

Graded Unit: Graded Units assess learners' ability to integrate what they have learned while working towards the Units of the Group Award. Their purpose is to add value to the Group Award, making it more than the sum of its parts, and to encourage learners to retain and adapt their skills and knowledge.

Lapsing date: When a Group Award is entered into its lapsing period, the following will apply:

- the Group Award will be deleted from the relevant catalogue
- the Group Award specification will remain until the qualification reaches its finish date at which point it will be removed from SQA's website and archived
- no new centres may be approved to offer the Group Award
- centres should only enter learners whom they expect to complete the Group Award during the defined lapsing period

SQA credit value: The credit value allocated to a Unit gives an indication of the contribution the Unit makes to an SQA Group Award. An SQA credit value of 1 given to an SQA Unit represents approximately 40 hours of programmed learning, teaching and assessment.

SCQF: The Scottish Credit and Qualification Framework (SCQF) provides the national common framework for describing all relevant programmes of learning and qualifications in Scotland. SCQF terminology is used throughout this guide to refer to credits and levels. For further information on the SCQF visit the SCQF website at **www.scqf.org.uk**.

SCQF credit points: SCQF credit points provide a means of describing and comparing the amount of learning that is required to complete a qualification at a given level of the Framework. One National Unit credit is equivalent to 6 SCQF credit points. One National Unit credit at Advanced Higher and one Higher National Unit credit (irrespective of level) is equivalent to 8 SCQF credit points.

SCQF levels: The level a qualification is assigned within the framework is an indication of how hard it is to achieve. The SCQF covers 12 levels of learning. HNCs and HNDs are available at SCQF levels 7 and 8 respectively. Higher National Units will normally be at levels 6–9 and Graded Units will be at level 7 and 8. National Qualification Group Awards are available at SCQF levels 2–6 and will normally be made up of National Units which are available from SCQF levels 2–7.

Subject Unit: Subject Units contain vocational/subject content and are designed to test a specific set of knowledge and skills.

Signposted Core Skills: refers to opportunities to develop Core Skills where these arise in learning and teaching but are not automatically certificated.

History of changes

It is anticipated that changes will take place during the life of the qualification and this section will record these changes. This document is the latest version and incorporates the changes summarised below. Centres are advised to check SQA's APS Navigator to confirm they are using the up to date qualification structure.

NOTE: Where a Unit is revised by another Unit:

- No new centres may be approved to offer the Unit which has been revised.
- Centres should only enter learners for the Unit which has been revised where they are expected to complete the Unit before its finish date.

Version Number	Description	Date
12	Minor amendment made to the credit transfer table	25/07/22
11	**Additional optional unit:** DF82 34 - Quality and Health & Safety Systems in Science Industries added to the optional section of the framework.	05/05/22
10	Minor amendments made to section 9.1 Course content	09/02/22
09	**Additional optional unit:** J4RC 34 – Environmental Awareness added to the optional section of the framework.	12/11/21
08	**Revision of Unit:** J5R2 35 - Instrumental Techniques 1 has replaced H930 35 - Instrumental Techniques 1 which finishes on 01/08/2023.	08/09/21
07	**Additional Optional Units:** Physical Chemistry: Theory and Laboratory Skills (H936 34) and Inorganic Chemistry: Theory and Laboratory Skills (H92Y 34) added to Optional section of the framework	04/06/20
06	**Revision of Units:** H927 34 Cell Biology: Theory and Laboratory Skills has been replaced by J2RE 34 Cell Biology: Theory and Laboratory Skills. H929 34 DNA and Genetics has been replaced by J2RF 34 DNA and Genetics. H927 34 and H929 34 will finish on 31/07/2022	17/09/19
05	**Revision of Unit:** H92F 35 Microbiological Techniques has been replaced by J2GM 35 Microbiological Techniques. H92F 35 will finish 31/07/2021	16/07/2019
04	Additional Optional Unit: Human Metabolism (H92D 35) added to optional section of the framework	21/01/19
03	**Additional Optional Unit:** Immunological Techniques (H92E 35) added to Optional section of the framework	31/01/17
02	**Additional Optional Unit:** Human Body Structure and Function (H92C 35) added to the Optional section of the framework	19/02/16

Acknowledgement

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of this qualification and to the Industrial Biotechnology Innovation Centre (IBioIC) for funding the validation of the award.

9 General information for learners

This section will help you decide whether this is the qualification for you by explaining what the qualification is about, what you should know or be able to do before you start, what you will need to do during the qualification and opportunities for further learning and employment.

The HND Industrial Biotechnology Group Award is a vocational qualification providing the knowledge and skills required to allow for progression to further study at degree level and employment in the industrial biotechnology industry.

The aims of the HND Industrial Biotechnology Group Award are designed to:

- Prepare you for an appropriate level of employment, in areas of industrial biotechnology such as research and industrial laboratories; chemical, biofuels, pharmaceutical, food and agriculture production and environmental science.
- Develop a range of contemporary vocational skills relating to the use, support and development of systems appropriate to employment at technician or professional level.
- Provide you with a range of skills to support learning in relevant SVQ 4 level programmes.
- Provide you with an element of vocational specialisation in a variety of areas such as biotechnology, chemical, therapeutics, food, agriculture, energy, and environmental.
- Prepare you for progression to further studies in industrial biotechnology related disciplines.
- Provide a flexible route to the Group Award, allowing access to those in employment through part-time study and full-time provision.
- Develop study and research skills.
- Develop Core Skills such as working with others in a team environment and enhancing communication skills through the use of report writing and working in a laboratory environment.
- Provide you with an opportunity to discover which areas of industrial biotechnology are of most interest to you by allowing you to experience each of the main branches of industrial biotechnology.

9.1 Course Content

The HND Industrial Biotechnology Group Award is an SCQF level 8 qualification which contains 30 credits (240 SCQF credit points). In order to achieve the HND Industrial Biotechnology Group Award, you must achieve 30 credits as follows:

Section	Credits required	Notes
Mandatory Section	22 mandatory credits must be achieved.	
Optional section A, B and C	3–8 credits must be achieved, depending on the choice of Units in the mandatory optional section.	Maximum of 8 credits for section A Maximum of 1 credit for section B Maximum of 4 credits for section C

It is recommended that all learners be given a copy of the HND Industrial Biotechnology Group Award structure from Section 2 with clarification and explanation as appropriate. You should liaise with your lecturer to ensure that you complete the necessary Units to achieve the Group Award itself but also that progression routes remain open to you.

The majority of the Units have theory and practical Outcomes. To pass the theory Outcomes you will be required to pass an end of Unit test. To pass a practical Outcome you will be expected to perform a range of laboratory experiments to a required standard, and to produce a report/pro forma on the experiment.

As well as undertaking assessments for all Units, you will also be required to undertake a one credit Graded Unit at SCQF level 7 and a two credit Graded Unit at SCQF level 8. The *Applied Sciences: Graded Unit 1* at SCQF level 7 will take the form of an investigation report, and the *Industrial Biotechnology: Graded Unit 2* will take the form of a laboratory and/or work based project with an associated investigation report.

The purpose of the Graded Units is to assess your ability to integrate and apply the knowledge and skills that you will have gained during your period of study. On successful completion of each Graded Unit you will be awarded a Grade of A, B or C according to the mark attained. This grading applies only to the relevant Graded Unit and not the overall HND Industrial Biotechnology Group Award.

Completion of the HND Industrial Biotechnology Group Award will give a qualification that has been designed by the Industrial Biotechnology industry and will give you the skills and knowledge required to look for employment in the sector or to progress to further study at degree level.

The HND Industrial Biotechnology Group Award will develop Core Skills in *Communication, Numeracy, Information and Communication Technology (ICT), Working with Others* and *Problem Solving*. Some Units will give certification for Core Skills, and others will give you the opportunity to develop these Core Skills.

Progression opportunities to and from the HND Industrial Biotechnology Group Award are illustrated in the below diagram: