



Higher National Graded Unit specification

General information for centres

This Graded Unit has been validated as part of the HND Applied Bioscience. Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

Graded Unit title: Applied Bioscience: Graded Unit 2

Graded Unit code: F3D6 35

Type of Graded Unit: Project

Assessment Instrument: Investigation

Credit points and level: 1 HN credit at SCQF level 8: (8 SCQF credit points at SCQF level 8*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Purpose: This Graded Unit is designed to provide evidence that the candidate has achieved the principal aims of the HND Applied Bioscience.

- ◆ develop the candidates' knowledge and understanding of the applications of biological science and technology in the land-based industries and the environmental sector
- ◆ develop scientific and practical laboratory skills, particularly in immunotechnology and DNA molecular technology
- ◆ prepare candidates for employment at a technical or supervisory level with land-based bioscience industries and the environmental sector
- ◆ prepare candidates for progression to degree level study in Applied Bioscience and Applied Animal Science and related areas

Recommended prior knowledge and skills: It is recommended that the candidate should have completed or be in the process of completing the following Units relating to the above specific aims prior to undertaking this Graded Unit:

DJ6X 35	<i>DNA Molecular Techniques: Theory and Practice</i>
DH2M 35	<i>Immunotechnology: Theory and Practice</i>
F2EC 35	<i>Livestock Nutrition</i>
F2E5 35	<i>Agroecosystems: Energetic Efficiency</i>
DV08 35	<i>Statistics for Science 2</i>

General information for centres (cont)

Core Skills: There are opportunities to develop the Core Skills of *Problem Solving* (Critical Thinking; Planning and Organising; Reviewing and Evaluating), *Information Technology* and *Communication* (Oral and Written), all at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Assessment: This Graded Unit will be assessed by the use of an investigation. The planning, methodology, development of the investigation, analysis of results and the project evaluation should provide evidence that demonstrates she/he has met the aims of the Graded Unit that it covers.

Administrative Information

Graded Unit code: F3D6 35

Graded Unit title: Applied Bioscience: Graded Unit 2

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History of changes:

Version	Description of change	Date

Source: SQA

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Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates

Graded Unit title: Applied Bioscience: Graded Unit 2

Conditions of assessment

The candidate should be given a date for completion of the Investigation. However, the instructions for the assessment task should be distributed to allow the candidate sufficient time to assimilate the details and carry out the assessment task. During the time between the distribution of the assessment task instructions and the completion date, assessors may answer questions, provide clarification, guidance and reasonable assistance. The assessment task should be marked as soon as possible after the completion date. The final grading given should reflect the quality of the candidate's evidence at the time of the completion date.

The evidence for the project is generated over time and involves three distinct stages, where each stage has to be achieved before the next is undertaken. Thus any re-assessment of stages must be undertaken before proceeding to the next stage.

If a candidate fails the project overall or wishes to upgrade, then this must be done using a *substantially different* project, ie all stages are undertaken using a new project, assignment, case study, etc. In this case, a candidate's grade will be based on the achievement in the re-assessment, if this results in a higher grade.

Instructions for designing the assessment task

The assessment task is a project. The project undertaken by the candidate must be a complex task which involves:

- ◆ variables which are complex or unfamiliar
- ◆ relationships which need to be clarified
- ◆ a context which may be familiar or unfamiliar to the candidate

The assessment task must require the candidate to:

- ◆ analyse the task and decide on a course of action for undertaking the project
- ◆ plan and organise work and carry it through to completion
- ◆ reflect on what has been done and draw conclusions for the future
- ◆ produce evidence of meeting the aims which this Graded Unit has been designed to cover

The assessment task must be an investigation involving the application of biological principles and techniques in the land-based sector, which will require the candidate to use research techniques to generate data which will then require analysis, manipulation and the methodology of the investigation evaluated. Within the investigation the candidate must carry out a minimum of one practical task involving immunotechnology and DNA molecular technology processes.

Guidance on grading candidates

Candidates who meet the minimum Evidence Requirements will have their achievement graded as C — competent, or A — highly competent or B somewhere between A and C. The grade related criteria to be used to judge candidate performance for this Graded Unit is specified in the following table.

Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates (cont)

Grade A	Grade C
<p>Is a seamless, coherent piece of work in which:</p> <ul style="list-style-type: none"> ◆ the project's aims and objectives are accurately listed. ◆ the initial project plan contains a comprehensive list of project activities and timings. This will include specific milestones to be achieved. A timeline plan will also be complete and accurate. ◆ the candidate develops a substantial knowledge base to support the demands of the project. ◆ the candidate demonstrates independence of thought by successfully completing the stages of the project with infrequent and minimal tutor support. ◆ the candidate identifies all known project risks and possible sources of error. These are then categorised in terms of their likely level of occurrence and identifies actions for minimising such risks and eliminating errors from the investigation. ◆ the candidate undertakes all practical activities according to current Health and Safety requirements and applies good laboratory practice to a high standard throughout the investigation. ◆ the candidate demonstrates competent, correct and appropriate use of one or more types of instruments/equipment. This use will include minimal supervision and monitoring. ◆ analysis of results is accurate and comprehensive, taking into account of all known sources of error. ◆ the laboratory book record is regularly maintained and provides a fully detailed, record of results and ideas concerning the investigation. ◆ the project report is well structured, contains only relevant facts and information, is technically accurate, uses clear and correct language and has clear and accurate conclusions and recommendations. 	<p>Is a co-ordinated piece of work which:</p> <ul style="list-style-type: none"> ◆ identifies the project's aims and objectives ◆ the initial project plan shows essential project activities and timings ◆ the candidate develops a largely sound knowledge base to support the demands of the project ◆ the candidate seeks tutor intervention to keep the investigation on track ◆ the candidate identifies the main risks that are likely to occur during the progress of the project and identifies the main actions for minimising such risks and eliminating errors ◆ the candidate undertakes a practical activity according to current Health and Safety requirements and applies sound laboratory practice ◆ the candidate demonstrates use of one or more types of instruments/equipment under supervision and monitoring ◆ analysis of results takes account of main sources of error ◆ the laboratory book record contains details about project ideas, results and progress ◆ the project report meets the minimum standards in terms of structure, technical accuracy, use of language and has some conclusions and recommendations

Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates (cont)

Grade A	Grade C
<ul style="list-style-type: none"> ◆ the project report includes a full critical analysis of results, data manipulation and a comprehensive evaluation of the project against project objectives ◆ the candidate identifies clear and full details of the new knowledge and skills she/he has developed and recognises key areas for improvement including back reflection on how the project may have been improved ◆ the candidate demonstrates a high level of self motivation throughout the project ◆ the candidate undertakes comprehensive research to underpin the project 	<ul style="list-style-type: none"> ◆ the project includes an analysis of results and an evaluation of the project against the project objectives ◆ the candidate provides an example of new knowledge and skills she/he has developed as a result of doing the project ◆ the candidate demonstrates an acceptable level of motivation throughout the project ◆ the candidate undertakes research to underpin the project

The project will be marked out of 100. Assessors will mark each stage of the project, taking into account the criteria outlined. The marks will then be aggregated to arrive at an overall mark for the project. Assessors will then assign an overall grade to the candidate for this Graded Unit based on the following grade boundaries.

A = 70% — 100%
 B = 60% — 69%
 C = 50% — 59%

Note: the candidate must achieve all of the minimum evidence specified below for each stage of the project in order to achieve the Graded Unit.

Evidence Requirements

The project consists of three stages: planning; developing; and evaluating. The following table specifies the minimum evidence required to pass each stage.

Note: The candidate must achieve **all of the minimum evidence** specified below for each stage of the project in order to pass the Graded Unit.

Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates (cont)

Project stage	Minimum Evidence Requirements
Stage 1 — Plan of action 18%	<p>An action plan of the investigation which includes:</p> <ul style="list-style-type: none"> ◆ the rationale for proposed investigation ◆ identification of research issues for the investigation ◆ the aims and objectives of the proposed investigation ◆ appropriate milestones for achieving the aims and objectives including a timeline action plan to manage and complete each subsequent stage ◆ identification of the research methods to be used during the investigation ◆ identification of appropriate Health and Safety procedures which may be relevant to the investigation <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Planning stage.</i></p>
Stage 2 — Developing 64%	<ul style="list-style-type: none"> ◆ the candidate conducts the investigation without seeking or requiring an excessive level of tutor support ◆ the candidate maintains motivation throughout all stages of the project <p>Produces an Investigation submission including evidence of:</p> <ul style="list-style-type: none"> ◆ a detailed and thorough library search for published literature concerning the proposed investigation. This will form the literature review (introduction) to the investigation. ◆ selection and description/itemisation of research methods and materials used throughout the investigation. ◆ undertaking of practical activities according to current Health and Safety requirements and application of laboratory practice to an acceptable standard when carrying out immunotechnology and DNA molecular technology procedures. ◆ identification, collection and collation of measured data. ◆ interpretation, manipulation, analysis of data. ◆ presentation of findings in appropriate format for the report eg graphs, tables, equations, figures, photographs. ◆ discussion of findings including reference to similar data found in the literature (where possible). ◆ conclusions drawn from the discussion. ◆ additional inclusions of a table of contents page and full listing of references in correct format. <p>Candidates may be required to answer questions from the assessor to validate the evidence.</p> <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Developing stage.</i></p>

Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates (cont)

Project stage	Minimum Evidence Requirements
Stage 3 — Evaluating the investigation 18%	Produces an evaluation submission which should include: <ul style="list-style-type: none"> ◆ an abstract summarising the investigation ◆ a critical evaluation of the extent to which the aims and objectives of the action plan have been achieved ◆ a critical evaluation of the investigation progress compared to the milestones listed in the timeline plan ◆ an assessment of the effectiveness of the research methods used in the investigation ◆ an assessment of the strengths and weaknesses of the output of the investigation (including any sources of error) ◆ a summary of any unforeseen events and how they were handled <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Evaluating stage.</i></p>

Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates (cont)

Support notes

The assessment task should be an investigation involving the application of biological principles and techniques in the land-based sector, which will require the candidate to use a number of research techniques in order to generate data which will then require analysis and manipulation. Within the investigation the candidate may be required to carry out practical tasks in the field as well as in those required in the laboratory. For example, data may be collected out with the laboratory environment which may then require a specific site visit for sampling. The candidate will then use the data to draw valid conclusions used in the discussion section of the report of the investigation.

An example of a project might be an investigation of the types and levels of microbial contaminants present in animal feedstuffs. Candidates could investigate microbial species using DNA sampling, DNA purification, DNA amplification (via the polymerase chain reaction) and DNA analysis using gel electrophoresis or enzyme linked immunosorbent assay procedures. This could provide the foundation for a wide variety of different investigations. Candidates would undertake a review of the current literature and then select which feedstuff(s) they could investigate, what measurements, analyses and tests they could carry out and plan their respective milestones. In their report candidates would be expected to discuss the implications of their findings on the nutrition, growth and health of livestock consuming the feed.

Candidates are expected to work independently within the context of a typical working laboratory environment. However, it may be possible for candidates to work together to collect data sources. The analysis, discussion and conclusions drawn from the results though should be undertaken individually.

Throughout the course of the investigation candidates should be encouraged to keep a hard-backed laboratory book in which results, methods and other information will be stored. Candidates should note specific methods and/or modifications to methods and adaptations to pieces of equipment for input into their final report. This will allow the candidate to keep a thorough track of progress made and allow them to see (via timeline) whether a milestone has been completed or act as a useful reference document when evaluating the project. The data presentation section of the investigation report will include critical analysis of the findings and show importance and relevance to the industry.

It is recommended that there are regular scheduled meetings between the tutor and the candidates to review progress, and to provide appropriate guidance. The guidance must not be such that it influences the final grading, but, for example, pointing out to the candidate the consequences of significant deviation from their plan during the development phase would be legitimate. It is desirable for notes of the meetings to be made for the purposes of clarity and to further simulate the working environment. The notes should be agreed upon by both parties.

Tutor questions may be used to ascertain the candidates' understanding of the issues contained in the Investigation report and to probe the validity of the proposal.

Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates (cont)

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on SQA's website: **www.sqa.org.uk**.

General information for candidates

This is a single credit Graded Unit at SCQF level 8: (8 SCQF credit points at SCQF level 8).

This Graded Unit is a project (investigation), to be completed towards the end of your course. It is designed to assess your ability to integrate and apply knowledge and understanding from the following defined Units in order to meet the principal aims of the HND Applied Bioscience award.

You will be asked to carry out an investigation using a variety of research methods and tools to generate data. This data will be at the core of your study and will be used to in the construction of a report of the investigation. The details of the project investigation will be discussed with your tutor, and may involve practical tasks in the laboratory or field. The investigation will require you to plan, develop and evaluate and you will be asked to provide an action planning document, an investigation report and a report to evaluate your management and effectiveness in conducting the investigation.

You have a high degree of autonomy during all stages of the Investigation, however your tutor is available for guidance and support as and when required. After the submission of your report, your tutor may interview you to probe your understanding of the issues contained in your reports and the validity of your conclusions.

The project (Investigation) will be assessed in three stages:

- 1 Planning.
- 2 Developing.
- 3 Evaluating.

You will need to pass the planning stage of your investigation before you can progress to the developing stage, and pass the developing stage before you continue to the evaluating stage.

The project will be marked out of 100. Assessors will mark each stage of the project, taking into account the criteria outlined. The marks will then be aggregated to arrive at an overall mark for the project. Assessors will then assign an overall grade to the candidate for this Graded Unit based on the following grade boundaries. To pass you must achieve 50% of the total marks and all the minimum Evidence Requirements for each of the three phases of the work.

A = 70% — 100%
B = 60% — 69%
C = 50% — 59%

There are opportunities to develop your Core Skills in *Problem Solving, Numeracy, Information Technology* and *Communication*, all at SCQF level 6 in this Unit.