

**Pearson  
BTEC Level 5 Diploma in  
Personal, Professional and  
Research Skills (QCF)**

**Pearson  
BTEC Level 5 Extended  
Diploma in Personal,  
Professional and Research  
Skills (QCF)**

BTEC Professional qualifications

**Specification**

First teaching December 2013

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# **BTEC Professional qualification titles covered by this specification**

## **Pearson BTEC Level 5 Diploma in Personal, Professional and Research Skills (QCF)**

## **BTEC Level 5 Extended Diploma in Personal, Professional and Research Skills (QCF)**

These qualifications have been accredited to the Qualifications and Credit Framework (QCF) and are eligible for public funding as determined by the Department for Education (DfE) under Section 96 of the Learning and Skills Act 2000.

The qualification titles listed above feature in the funding lists published annually by the DfE and the regularly updated website [www.education.gov.uk/](http://www.education.gov.uk/). The QCF Qualification Number (QN) should be used by centres when they wish to seek public funding for their learners. Each unit within a qualification will also have a QCF unit code.

The QCF qualification and unit codes will appear on learners' final certification documentation.

The QN for the qualification in this publication is:

Pearson BTEC Level 5 Diploma in Personal, Professional and Research Skills (QCF)	601/1847/7
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BTEC Level 5 Extended Diploma in Personal, Professional and Research Skills (QCF)	601/1848/9
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The qualification title will appear on learners' certificates. Learners need to be made aware of this when they are recruited by the centre and registered with Pearson.

This qualification is accredited by Ofqual as being Stand Alone.

# **Welcome to the Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (QCF)**

We are delighted to introduce our new qualifications, which will be available for teaching from December 2013. These qualifications conform to the requirements of the QCF (Qualifications and Credit Framework).

## **Focusing on the Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (QCF)**

The broad purpose of the qualifications is to give learners the opportunity to understand and develop the skills needed for their own personal and professional development and also their research skills. These skills may be relevant to learners wanting to apply for further higher education courses, such as progressing from HND or foundation degrees on to honours degrees or conversion courses, or to those in the workplace wanting to develop or refresh these skills in relation to their work responsibilities.

The qualifications include mandatory units on both personal and professional development and research, which learners can use to understand the skills they require or need to develop and practise and apply their research skills.

There are a wide choice of optional units available, organised in specific endorsed pathways, which allows learners to engage in further study in a sector which they are already familiar with through previous study or work, or another sector into which they would like to progress, either for further study or work.

Possible progression routes to this qualification are from HNC/HND Diplomas or Foundation degrees. Possible progression routes from this qualification are an undergraduate honours degree or a conversion course.

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# What are BTEC Level 5 Professional qualifications?

BTEC Professional qualifications are qualifications at Level 4 to Level 8 in the Qualifications and Credit Framework (QCF) and are designed to provide professional work-related qualifications in a range of sectors. They give learners the knowledge, understanding and skills that they need to prepare for employment. The qualifications also provide career development opportunities for those already in work. Consequently they provide a course of study for full-time or part-time learners in schools, colleges and training centres.

BTEC Professional qualifications provide much of the underpinning knowledge and understanding for the National Occupational Standards for the sector, where these are appropriate. They are supported by the relevant Standards Setting Body (SSB) or Sector Skills Council (SSC). A number of BTEC Professional qualifications are recognised as the knowledge components of Apprenticeships Frameworks.

On successful completion of a BTEC Professional qualification, learners can progress to or within employment and/or continue their study in the same, or related vocational area.

The QCF is a framework which awards credit for qualifications and units and aims to present qualifications in a way that is easy to understand and measure. It enables learners to gain qualifications at their own pace along flexible routes.

There are three sizes of qualification in the QCF:

- Award (1 to 12 credits)
- Certificate (13 to 36 credits)
- Diploma (37 credits and above).

Every unit and qualification in the framework will have a credit value.

The credit value of a unit specifies the number of credits that will be awarded to a learner who has achieved the learning outcomes of the unit.

The credit value of a unit is based on:

- one credit for those learning outcomes achievable in 10 hours of learning
- learning time – defined as the time taken by learners at the level of the unit, on average, to complete the learning outcomes of the unit to the standard determined by the assessment criteria.

The credit value of the unit will remain constant in all contexts, regardless of the assessment method used for the qualification(s) to which it contributes.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

## **Pearson BTEC Level 5 Award**

The Pearson BTEC Level 6 Award provides an introduction to the skills, qualities and knowledge that may be required for employment in a particular vocational sector.

## **Pearson BTEC Level 5 Certificate**

For adult learners the Pearson BTEC Level 6 Certificate can extend their knowledge and understanding of work in a particular sector. It is a suitable qualification for those wishing to change career or move into a particular area of employment following a career break.

## **Pearson BTEC Level 5 Diploma**

The Pearson BTEC Level 6 Diploma extends the work-related focus from the Pearson BTEC Level 6 Certificate. There is potential for the qualification to prepare learners for employment in a particular vocational sector and it is suitable for those who have decided that they wish to enter a specific area of work.

## **Key features of the Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (QCF)**

The Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (QCF) have been developed to give learners the opportunity to:

- engage in learning that is relevant to them and that will give them opportunities to develop a range of skills and techniques, and attributes essential for successful performance in working life
- achieve a nationally recognised Level 5 vocationally-related qualification
- progress to employment in a particular vocational sector
- progress to related general and/or vocational qualifications.

## **National Occupational Standards**

Where relevant, Pearson BTEC Level 5 qualifications are designed to provide some of the underpinning knowledge and understanding for the National Occupational Standards (NOS), as well as developing practical skills in preparation for work and possible achievement of NVQs in due course. NOS form the basis of National Vocational Qualifications (NVQs).

Pearson BTEC Level 5 (QCF) qualifications do not purport to deliver occupational competence in the sector, which should be demonstrated in a work context.

# Rules of combination

The rules of combination specify the credits that need to be achieved, through the completion of particular units, for the qualification to be awarded. All accredited qualifications within the QCF have rules of combination.

## Rules of combination for the Pearson BTEC Level 5 qualifications

When combining units for a Pearson BTEC Level 5, it is the centre's responsibility to ensure that the following rules of combination are adhered to.

### Pearson BTEC Level 5 Diploma

- 1 Qualification credit value: a minimum of 50 credits.
- 2 Minimum credit to be achieved at, or above, the level of the qualification: 35 credits.
- 3 All credits must be achieved from the units listed in the specific qualification structure.

### Pearson BTEC Level 5 Extended Diploma

- 1 Qualification credit value: a minimum of 65 credits.
- 2 Minimum credit to be achieved at, or above, the level of the qualification: 50 credits.
- 3 All credits must be achieved from the units listed in the specific qualification structure.

# **Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (QCF)**

These two qualifications are available with five specific endorsed pathways. Learners will need to select a specific sector endorsed pathway. The pathways are:

- Business
- Life Sciences
- Engineering
- Art and design
- Social Sciences

The two mandatory units are exactly the same for each endorsed pathway and the available optional units for each pathway are shown in the following qualification structures.

## Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (Business) (QCF)

The Pearson BTEC Level 5 Diploma in Personal, Professional and Research Skills (Business) (QCF) is a 50 credit qualification that consists of 2 mandatory units plus **one** optional unit.

The Pearson BTEC Level 5 Extended Diploma in Personal, Professional and Research Skills (Business) (QCF) is a 65 credit qualification that consists of 2 mandatory units plus **two** optional units. At least **one** optional unit must be at level 5.

<b>Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (Business). (QCF)</b>			
<b>Unit</b>	<b>Mandatory units</b>	<b>Credit</b>	<b>Level</b>
1	Research Project	20	5
2	Personal and Professional Development	15	5
<b>Unit</b>	<b>Optional units (learners take one unit for the Diploma and two units for the Extended Diploma – only one of which can be at level 4)</b>	<b>Credit</b>	<b>Level</b>
3	Organisations and Behaviour	15	4
4	Marketing Principles	15	4
5	Financial Accounting and Reporting *	15	4
6	Management Accounting *	15	5
7	Business Psychology	15	5
8	Corporate Environmental and Social Management	15	5
9	Business Ethics	15	5

**\* There is a forbidden combination between these 2 units because of overlap, only one of these can be taken**

## Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (Life Sciences) (QCF)

The Pearson BTEC Level 5 Diploma in Personal, Professional and Research Skills (Life Sciences) (QCF) is a 50 credit qualification that consists of 2 mandatory units plus **one** optional unit.

The Pearson BTEC Level 5 Extended Diploma in Personal, Professional and Research Skills (Life Sciences) (QCF) is a 65 credit qualification that consists of 2 mandatory units plus **two** optional units. At least **one** optional unit must be at level 5.

<b>Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (Life Sciences). (QCF)</b>			
<b>Unit</b>	<b>Mandatory units</b>	<b>Credit</b>	<b>Level</b>
1	Research Project	20	5
2	Personal and Professional Development	15	5
<b>Unit</b>	<b>Optional units (learners take one unit for the Diploma and two units for the Extended Diploma – only one of which can be at level 4)</b>	<b>Credit</b>	<b>Level</b>
10	Analysis of Scientific Data and Information	15	4
11	Pharmacological Principles of Drug Actions	15	5
12	Medicinal Chemistry	15	5
13	Environmental Monitoring and Analysis	15	5
14	Environmental Management and Conservation	15	5

## Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (Engineering) (QCF)

The Pearson BTEC Level 5 Diploma in Personal, Professional and Research Skills (Engineering) (QCF) is a 50 credit qualification that consists of 2 mandatory units plus **one** optional unit.

The Pearson BTEC Level 5 Extended Diploma in Personal, Professional and Research Skills (Engineering) (QCF) is a 65 credit qualification that consists of 2 mandatory units plus **two** optional units. At least **one** optional unit must be at level 5.

<b>Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (Engineering). (QCF)</b>			
<b>Unit</b>	<b>Mandatory units</b>	<b>Credit</b>	<b>Level</b>
1	Research Project	20	5
2	Personal and Professional Development	15	5
<b>Unit</b>	<b>Optional units (learners take one unit for the Diploma and two units for the Extended Diploma – only one of which can be at level 4)</b>	<b>Credit</b>	<b>Level</b>
15	Analytical Methods for Engineers	15	4
16	Business Management techniques for Engineers	15	4
17	Mechanical Principles	15	5
18	Engineering Design	15	5
19	Manufacturing Planning and Scheduling Principles	15	5

## Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (Art and Design) (QCF)

The Pearson BTEC Level 5 Diploma in Personal, Professional and Research Skills (Art and Design) (QCF) is a 50 credit qualification that consists of 2 mandatory units plus **one** optional unit.

The Pearson BTEC Level 5 Extended Diploma in Personal, Professional and Research Skills (Art and Design) (QCF) is a 65 credit qualification that consists of 2 mandatory units plus **two** optional units. At least **one** optional unit must be at level 5.

<b>Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (Art and Design). (QCF)</b>			
<b>Unit</b>	<b>Mandatory units</b>	<b>Credit</b>	<b>Level</b>
1	Research Project	20	5
2	Personal and Professional Development	15	5
<b>Unit</b>	<b>Optional units (learners take one unit for the Diploma and two units for the Extended Diploma – only one of which can be at level 4)</b>	<b>Credit</b>	<b>Level</b>
20	Contextual and Cultural Referencing in Art and Design	15	4
21	Professional Practice in Art and Design	15	5
22	Critical Study in Art and Design	15	5
23	Professional Studies in Art and Design	15	5

## Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (Social Sciences) (QCF)

The Pearson BTEC Level 5 Diploma in Personal, Professional and Research Skills (Social Sciences) (QCF) is a 50 credit qualification that consists of 2 mandatory units plus **one** optional unit.

The Pearson BTEC Level 5 Extended Diploma in Personal, Professional and Research Skills (Social Sciences) (QCF) is a 65 credit qualification that consists of 2 mandatory units plus **two** optional units. At least **one** optional unit must be at level 5.

<b>Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (Social Sciences). (QCF)</b>			
<b>Unit</b>	<b>Mandatory units</b>	<b>Credit</b>	<b>Level</b>
1	Research Project	20	5
2	Personal and Professional Development	15	5
<b>Unit</b>	<b>Optional units (learners take one unit for the Diploma and two units for the Extended Diploma – only one of which can be at level 4)</b>	<b>Credit</b>	<b>Level</b>
24	Understanding the learning process	15	5
25	Psychology of Human and Criminal Behaviour	15	4
26	The Global Environment	15	5
27	Justice and Punishment	15	4
20	Contextual and Cultural Referencing in Art and Design	15	4

# Assessment

All units within these qualifications are internally assessed. The qualifications are criterion referenced, based on the achievement of all the specified learning outcomes.

To achieve a 'pass' a learner must have successfully passed **all** the assessment criteria.

## Guidance

The purpose of assessment is to ensure that effective learning has taken place to give learners the opportunity to:

- meet the standard determined by the assessment criteria and
- achieve the learning outcomes.

All the assignments created by centres should be reliable and fit for purpose, and should be built on the unit assessment criteria. Assessment tasks and activities should enable learners to produce valid, sufficient and reliable evidence that relates directly to the specified criteria. Centres should enable learners to produce evidence in a variety of different forms, including performance observation, presentations and posters, along with projects, or time-constrained assessments.

Centres are encouraged to emphasise the practical application of the assessment criteria, providing a realistic scenario for learners to adopt, and making maximum use of practical activities. The creation of assignments that are fit for purpose is vital to achievement and their importance cannot be over-emphasised.

The assessment criteria must be clearly indicated in the assignments briefs. This gives learners focus and helps with internal verification and standardisation processes. It will also help to ensure that learner feedback is specific to the assessment criteria.

When designing assignments briefs, centres are encouraged to identify common topics and themes. A central feature of vocational assessment is that it allows for assessment to be:

- current, ie to reflect the most recent developments and issues
- local, ie to reflect the employment context of the delivering centre
- flexible to reflect learner needs, ie at a time and in a way that matches the learner's requirements so that they can demonstrate achievement.

## Qualification grade

Learners who achieve the minimum eligible credit value specified by the rule of combination will achieve the qualification at pass grade.

In the Pearson BTEC Level 5 Professional qualifications each unit has a credit value which specifies the number of credits that will be awarded to a learner who has achieved the learning outcomes of the unit. This has been based on:

- one credit for those learning outcomes achievable in 10 hours of learning time

- learning time being defined as the time taken by learners at the level of the unit, on average, to complete the learning outcomes of the unit to the standard determined by the assessment criteria
- the credit value of the unit remaining constant regardless of the method of assessment used or the qualification to which it contributes.

## Quality assurance of centres

Pearson BTEC Levels 4–7 qualifications provide a flexible structure for learners enabling programmes of varying credits and combining different levels. For the purposes of quality assurance, all individual qualifications and units are considered as a whole.

Centres delivering the Pearson BTEC Levels 4–7 qualifications must be committed to ensuring the quality of the units and qualifications they deliver, through effective standardisation of assessors and verification of assessor decisions. Centre quality assurance and assessment is monitored and guaranteed by Pearson.

### **The Pearson quality assurance processes will involve:**

- centre approval for those centres not already recognised as a centre for BTEC qualifications
- approval for the Pearson BTEC Levels 4–7 qualifications and units.

For all centres delivering BTEC qualifications at Levels 4–7, Pearson allocates a Standards Verifier (EE) for each sector offered, who will conduct an annual visit to quality assure the programmes.

## Approval

Centres are required to declare their commitment to ensuring the quality of the programme of learning and providing appropriate assessment opportunities for learners that lead to valid and accurate assessment outcomes. In addition, centres will commit to undertaking defined training and online standardisation activities.

Centres already holding BTEC approval are able to gain qualification approval online. New centres must complete a centre approval application.

## Quality assurance guidance

Details of quality assurance for the Pearson BTEC Levels 4–7 qualifications are available on our website ([www.edexcel.com](http://www.edexcel.com)) under Signposts to Quality ([www.edexcel.com/quals/BTEC/quality/Pages/default.aspx](http://www.edexcel.com/quals/BTEC/quality/Pages/default.aspx)).

# Programme design and delivery

## Mode of delivery

Pearson does not normally define the mode of delivery for Pearson BTEC Level 4 to Level 8 qualifications. Centres are free to offer the qualifications using any mode of delivery (such as full-time, part-time, evening only, distance learning) that meets their learners' needs. Whichever mode of delivery is used, centres must ensure that learners have appropriate access to the resources identified in the specification and to the subject specialists delivering the units. This is particularly important for learners studying for the qualification through open or distance learning.

Learners studying for the qualification on a part-time basis bring with them a wealth of experience that should be utilised to maximum effect by tutors and assessors. The use of assessment evidence drawn from learners' work environments should be encouraged. Those planning the programme should aim to enhance the vocational nature of the qualification by:

- liaising with employers to ensure a course relevant to learners' specific needs
- accessing and using non-confidential data and documents from learners' workplaces
- including sponsoring employers in the delivery of the programme and, where appropriate, in the assessment
- linking with company-based/workplace training programmes
- making full use of the variety of experience of work and life that learners bring to the programme.

## Resources

Pearson BTEC Level 5 qualifications are designed to give learners an understanding of the skills needed for specific vocational sectors. Physical resources need to support the delivery of the programme and the assessment of the learning outcomes, and should therefore normally be of industry standard. Staff delivering programmes and conducting the assessments should be familiar with current practice and standards in the sector concerned. Centres will need to meet any specific resource requirements to gain approval from Pearson.

Where specific resources are required these have been indicated in individual units in the *Essential resources* sections.

## Delivery approach

It is important that centres develop an approach to teaching and learning that supports the vocational nature of Pearson BTEC Level 5 qualifications and the mode of delivery. Specifications give a balance of practical skill development and knowledge requirements, some of which can be theoretical in nature. Tutors and assessors need to ensure that appropriate links are made between theory and practical application and that the knowledge base is applied to the sector. This requires the development of relevant and up-to-date teaching materials that allow learners to apply their learning to actual events and activity within the sector. Maximum use should be made of learners' experience.

# Access and recruitment

Pearson's policy regarding access to its qualifications is that:

- they should be available to everyone who is capable of reaching the required standards
- they should be free from any barriers that restrict access and progression
- there should be equal opportunities for all wishing to access the qualifications.

Centres are required to recruit learners to BTEC qualifications with integrity. This will include ensuring that applicants have appropriate information and advice about the qualifications and that the qualification will meet their needs. Centres should take appropriate steps to assess each applicant's potential and make a professional judgement about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification. Centres should consult Pearson's policy on learners with particular requirements.

Centres will need to review the entry profile of qualifications and/or experience held by applicants, considering whether this profile shows an ability to progress to a higher level qualification.

Please note that UK Border Agency (UKBA) requires adult students to have acceptable English language ability before they can apply to become an adult student under Tier 4 (General) of the points-based system. As an education provider you must ensure that the applicant is competent in the English language at a minimum of Common European Framework of Reference (CEFR) level B1 for a QCF level 4 or 5 qualification and a minimum of CEFR level B2 for a QCF level 6 qualification. The only exception is for an applicant to a Higher Education Institution (HEI) who is gifted; or competent at CEFR level B1 and the HEI believes that the applicant will reach B2 level after a short period of pre-sessional language training before the main course.

## Restrictions on learner entry

The Pearson BTEC Level 5 Diploma and Extended Diploma in Personal, Professional and Research Skills (QCF) are accredited on the QCF for learners aged 18 and above.

## Access arrangements and special considerations

Further information on access arrangements can be found in the Joint Council for Qualifications (JCQ) document Access Arrangements, Reasonable Adjustments and Special Consideration for General and Vocational qualifications.

Details on how to make adjustments for learners with protected characteristics are given in the document Pearson Supplementary Guidance for Reasonable Adjustment and Special Consideration in Vocational Internally Assessed Units.

Both documents are on our website at: [www.edexcel.com/policies](http://www.edexcel.com/policies)

## **Recognition of Prior Learning**

Recognition of Prior Learning (RPL) is a method of assessment (leading to the award of credit) that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and so do not need to develop through a course of learning.

Pearson encourages centres to recognise learners' previous achievements and experiences whether at work, home and at leisure, as well as in the classroom. RPL provides a route for the recognition of the achievements resulting from continuous learning.

RPL enables recognition of achievement from a range of activities using any valid assessment methodology. Provided that the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable for accrediting a unit, units or a whole qualification. Evidence of learning must be sufficient, reliable and valid.

## **Unit format**

All units in the Pearson BTEC Level 5 Professional qualifications have a standard format. The unit format is designed to give guidance on the requirements of the qualification for learners, tutors, assessors and those responsible for monitoring national standards.

Each unit has the following sections.

### **Unit title**

The unit title is accredited on the QCF and this form of words will appear on the learner's Notification of Performance (NOP).

### **Unit code**

Each unit is assigned a QCF unit code that appears with the unit title on the National Database of Accredited Qualifications.

### **QCF level**

All units and qualifications within the QCF will have a level assigned to them, which represents the level of achievement. There are nine levels of achievement, from Entry Level to Level 8. The level of the unit has been informed by the QCF level descriptors and, where appropriate, the NOS and/or other sector/professional benchmarks.

### **Credit value**

All units have a credit value. The minimum credit value that may be determined for a unit is one, and credits can only be awarded in whole numbers. Learners will be awarded credits for the successful completion of whole units.

## **Guided learning hours**

Guided learning hours are defined as all the times when a tutor, trainer or facilitator is present to give specific guidance towards the learning aim being studied on a programme. This definition includes lectures, tutorials and supervised study in, for example, open learning centres and learning workshops. It also includes time spent by staff assessing learners' achievements. It does not include time spent by staff in day-to-day marking of assignments or homework where the learner is not present.

## **Unit aim**

The aim provides a clear summary of the purpose of the unit and is a succinct statement that summarises the learning outcomes of the unit.

## **Unit abstract**

This gives the reader an appreciation of the unit in the vocational setting of the qualification, as well as highlighting the focus of the unit. It gives the reader a snapshot of the unit and the key knowledge, skills and understanding gained while studying the unit. It also highlights any links to the appropriate vocational sector by describing how the unit relates to that sector.

## **Learning outcomes**

The learning outcomes of a unit set out what a learner is expected to know, understand or be able to do as the result of a process of learning.

## **Assessment criteria**

The assessment criteria of a unit specify the standard a learner is expected to meet to demonstrate that a learning outcome, or set of learning outcomes, has been achieved. The learning outcomes and assessment criteria clearly articulate the learning achievement for which the credit will be awarded at the level assigned to the unit.

## **Unit content**

The unit content identifies the breadth of knowledge, skills and understanding needed to design and deliver a programme of learning to achieve each of the learning outcomes. This is informed by the underpinning knowledge and understanding requirements of the related National Occupational Standards (NOS), where relevant. The content provides the range of subject material for the programme of learning and specifies the skills, knowledge and understanding required for achievement of the unit.

Each learning outcome is stated in full and then the key phrases or concepts related to that learning outcome are listed in italics followed by the subsequent range of related topics.

## Relationship between content and assessment criteria

The learner should have the opportunity to cover all of the unit content.

It is not a requirement of the unit specification that all of the content is assessed. However, the indicative content will need to be covered in a programme of learning in order for learners to be able to meet the standard determined in the assessment criteria.

## Content structure and terminology

The information below shows the unit content is structured and gives the terminology used to explain the different components within the content.

- Learning outcome: this is shown in bold at the beginning of each section of content.
- Italicised sub-heading: it contains a key phrase or concept. This is content which must be covered in the delivery of the unit. Colons mark the end of an italicised sub-heading.
- Elements of content: the elements are in plain text and amplify the sub-heading. The elements must be covered in the delivery of the unit. Semi-colons mark the end of an element.
- Brackets contain amplification of content which must be covered in the delivery of the unit.
- 'e.g' is a list of examples, used for indicative amplification of an element (that is, the content specified in this amplification could be covered or could be replaced by other, similar material).

## Essential guidance for tutors

This section gives tutors additional guidance and amplification to aid understanding and a consistent level of delivery and assessment. It is divided into the following sections.

- *Delivery* – explains the content's relationship to the learning outcomes and offers guidance about possible approaches to delivery. This section is based on the more usual delivery modes but is not intended to rule out alternative approaches.
- *Assessment* – gives amplification about the nature and type of evidence that learners need to produce in order to achieve the unit. This section should be read in conjunction with the assessment criteria.
- *Essential resources* – identifies any specialist resources needed to allow learners to generate the evidence required for each unit. The centre will be asked to ensure that any requirements are in place when it seeks approval from Edexcel to offer the qualification.
- *Indicative resource materials* – gives a list of learner resource material that benchmarks the level of study.



# Units



# Units

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# Unit 1: Research Project

Unit code:	K/601/0941
QCF level:	5
Credit value:	20 credits
Guided learning hours:	60

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## Aim

To develop learners' skills of independent enquiry and critical analysis by undertaking a sustained research investigation of direct relevance to their Higher Education programme and professional development.

## Unit abstract

This unit is designed to enable learners to become confident using research techniques and methods. It addresses the elements that make up formal research including the proposal, a variety of research methodologies, action planning, carrying out the research itself and presenting the findings. To complete the unit satisfactorily, learners must also understand the theory that underpins formal research.

The actual research depends on the learner, the context of their area of learning, their focus of interest and the anticipated outcomes. The unit draws together a range of other areas from within the programme to form a holistic piece of work that will make a positive contribution to the learner's area of interest. Learners should seek approval from their tutors before starting their research project.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand how to formulate a research specification
- 2 Be able to implement the research project within agreed procedures and to specification
- 3 Be able to evaluate the research outcomes
- 4 Be able to present the research outcomes.

## Unit content

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### 1 Understand how to formulate a research specification

*Research formulation:* aims and objectives; rationale for selection; methodology for data collection and analysis; literature review; critique of references from primary sources e.g. questionnaires, interviews; secondary sources e.g. books, journals, internet; scope and limitations; implications e.g. resources

*Hypothesis:* definition; suitability; skills and knowledge to be gained; aims and objectives; terms of reference; duration; ethical issues

*Action plan:* rationale for research question or hypothesis; milestones; task dates; review dates; monitoring/reviewing process; strategy

*Research design:* type of research e.g. qualitative, quantitative, systematic, original; methodology; resources; statistical analyses; validity; reliability; control of variables

### 2 Be able to implement the research project within agreed procedures and to specification

*Implement:* according to research design and method; test research hypotheses; considering test validity; reliability

*Data collection:* selection of appropriate tools for data collection; types e.g. qualitative, quantitative; systematic recording; methodological problems e.g. bias, variables and control of variables, validity and reliability

*Data analysis and interpretation:* qualitative and quantitative data analysis – interpreting transcripts; coding techniques; specialist software; statistical tables; comparison of variable; trends; forecasting

### 3 Be able to evaluate the research outcomes

*Evaluation of outcomes:* an overview of the success or failure of the research project planning, aims and objectives, evidence and findings, validity, reliability, benefits, difficulties, conclusion(s)

*Future consideration:* significance of research investigation; application of research results; implications; limitations of the investigation; improvements; recommendations for the future, areas for future research

### 4 Be able to present the research outcomes

*Format:* professional delivery format appropriate to the audience; use of appropriate media

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>		<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1	Understand how to formulate a research specification	1.1 formulate and record possible research project outline specifications 1.2 identify the factors that contribute to the process of research project selection 1.3 undertake a critical review of key references 1.4 produce a research project specification 1.5 provide an appropriate plan and procedures for the agreed research specification
LO2	Be able to implement the research project within agreed procedures and to specification	2.1 match resources efficiently to the research question or hypothesis 2.2 undertake the proposed research investigation in accordance with the agreed specification and procedures 2.3 record and collate relevant data where appropriate
LO3	Be able to evaluate the research outcomes	3.1 use appropriate research evaluation techniques 3.2 interpret and analyse the results in terms of the original research specification 3.3 make recommendations and justify areas for further consideration
LO4	Be able to present the research outcomes	4.1 use an agreed format and appropriate media to present the outcomes of the research to an audience.

## **Guidance**

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### **Links**

This unit may be linked to single or several units in the programme, depending on the research topic and the context of the area of learning.

### **Essential requirements**

Tutors will need to establish the availability of resources to support independent study before learners proceed with their proposal.

### **Employer engagement and vocational contexts**

Centres should try to establish relationships with appropriate organisations in order to bring realism and relevance to learners' research projects.

# Unit 2: Personal and Professional Development

Unit code:	T/601/0943
QCF level:	5
Credit value:	15 credits
Guided learning hours:	60

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## Aim

This unit aims to help the learner become an effective and confident self-directed employee. This helps the learner become confident in managing own personal and professional skills to achieve personal and career goals.

## Unit abstract

This unit is designed to enable learners to assess and develop a range of professional and personal skills in order to promote future personal and career development. It also aims to develop learners' ability to organise, manage and practise a range of approaches to improve their performance as self-directed learners in preparation for work or further career development.

The unit emphasises the needs of the individual but within the context of how the development of self-management corresponds with effective team management in meeting objectives.

Learners will be able to improve their own learning, be involved in teamwork and be more capable of problem solving through the use of case studies, role play and real-life activities.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand how self-managed learning can enhance lifelong development
- 2 Be able to take responsibility for own personal and professional development
- 3 Be able to implement and continually review own personal and professional development plan
- 4 Be able to demonstrate acquired interpersonal and transferable skills.

## Unit content

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### 1 Understand how self-managed learning can enhance lifelong development

*Self-managed learning:* self-initiation of learning processes; clear goal setting, e.g. aims and requirements, personal orientation achievement goals, dates for achievement, self-reflection

*Learning styles:* personal preferences; activist; pragmatist; theorist; reflector, e.g. reflexive modernisation theory; Kolb's learning cycle

*Approaches:* learning through research; learning from others, e.g. mentoring/coaching, seminars, conferences, secondments, interviews, use of the internet, social networks, use of bulletin boards, news groups

*Effective learning:* skills of personal assessment; planning, organisation and evaluation

*Lifelong learning:* self-directed learning; continuing professional development; linking higher education with industry, further education, Recognition of Prior Learning, Apprenticeships, Credit Accumulation and Transfer Schemes

*Assessment of learning:* improved ability range with personal learning; evidence of improved levels of skill; feedback from others; learning achievements and disappointments

### 2 Be able to take responsibility for own personal and professional development

*Self-appraisal:* skills audit (personal profile using appropriate self-assessment tools); evaluating self-management; personal and interpersonal skills; leadership skills

*Development plan:* current performance; future needs; opportunities and threats to career progression; aims and objectives; achievement dates; review dates; learning programme/activities; action plans; personal development plan

*Portfolio building:* developing and maintaining a personal portfolio

*Transcripts:* maintaining and presenting transcripts including curriculum vitae

### 3 Be able to implement and continually review own personal and professional development plan

*Learning styles and strategies:* types of styles; awareness of own personal style; impact of personal style and interactions with others

*Learning from others:* formal learning and training; observation; mentoring; supervision; tutorials; informal networks; team members; line managers; other professionals

*Evaluation of progress:* setting and recording of aims and objectives; setting targets; responding to feedback; re-setting aims and targets; establishing and recognising strengths and weaknesses; directions for change; cycles of activity (monitoring, reflecting and planning)

**4 Be able to demonstrate acquired interpersonal and transferable skills**

*Transferable skills:* personal effectiveness (ability to communicate effectively at all levels, initiative, self-discipline, reliability, creativity, problem solving)

*Verbal and non-verbal communication:* effective listening, respect for others' opinions; negotiation; persuasion; presentation skills; assertiveness; use of ICT

*Delivery formats:* ability to deliver transferable skills using a variety of formats

*Working with others:* team player; flexibility/adaptability; social skills

*Time management:* prioritising workloads; setting work objectives; using time effectively; making and keeping appointments; reliable estimates of task time

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand how self-managed learning can enhance lifelong development	1.1 evaluate approaches to self-managed learning 1.2 propose ways in which lifelong learning in personal and professional contexts could be encouraged 1.3 evaluate the benefits of self-managed learning to the individual and organisation
LO2 Be able to take responsibility for own personal and professional development	2.1 evaluate own current skills and competencies against professional standards and organisational objectives 2.2 identify own development needs and the activities required to meet them 2.3 identify development opportunities to meet current and future defined needs 2.4 devise a personal and professional development plan based on identified needs
LO3 Be able to implement and continually review own personal and professional development plan	3.1 discuss the processes and activities required to implement the development plan 3.2 undertake and document development activities as planned 3.3 reflect critically on own learning against original aims and objectives set in the development plan 3.4 update the development plan based on feedback and evaluation
LO4 Be able to demonstrate acquired interpersonal and transferable skills	4.1 select solutions to work-based problems 4.2 communicate in a variety of styles and appropriate manner at various levels 4.3 evaluate and use effective time management strategies.

## Guidance

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### Links

This unit has links to the Management and Leadership NOS.

### Essential requirements

Activities carried out in this unit could be part of the mainstream academic activity and could be integrated into the whole programme of study. Learners would benefit from links with the learning outcomes of other units and if review meetings are held regularly.

A personal development portfolio or progress file should be put together, which contains all information and personal records 'owned' by the learner, including planning and monitoring progress towards the achievement of personal objectives. This could be web based, paper based or another format. Potentially this could form the basis of an extended record of a lifelong record of learning and achievement.

Tutors should be aware that textbooks are updated frequently and that they should use the latest editions where available. This is a practical unit and textbook materials should be used for reference purposes.



## Unit 3: Organisations and Behaviour

Unit code:	H/601/0551
QCF level:	4
Credit value:	15 credits
Guided learning hours:	60

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### Aim

The aim of this unit is to give learners an understanding of individual and group behaviour in organisations and to examine current theories and their application in managing behaviour in the workplace.

### Unit abstract

This unit focuses on the behaviour of individuals and groups within organisations. It explores the links between the structure and culture of organisations and how these interact and influence the behaviour of the workforce. The structure of a large multi-national company with thousands of employees worldwide will be very different from a small local business with 20 employees. The way in which an organisation structures and organises its workforce will impact on the culture that develops within the organisation. This system of shared values and beliefs will determine and shape the accepted patterns of behaviour of an organisations workforce. The culture in organisations that differ in size, for example, or are from different sectors of the economy can be very different.

The structure and culture of an organisation are key factors which contribute to motivating the workforce at all levels of the organisation. The Japanese were instrumental in developing a culture of 'continuous improvement through teamwork' in their manufacturing industry. This culture has now been exported around the world and encapsulates the way in which structure and culture contribute to patterns of behaviour in the workplace. This unit will develop learner understanding of the behaviour of people within organisations and of the significance that organisational design has on shaping that behaviour.

### Learning outcomes

#### On successful completion of this unit a learner will:

- 1 Understand the relationship between organisational structure and culture
- 2 Understand different approaches to management and leadership
- 3 Understand ways of using motivational theories in organisations
- 4 Understand mechanisms for developing effective teamwork in organisations.

# Unit content

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## 1 Understand the relationship between organisational structure and culture

*Types of organisation and associated structures:* functional, product-based, geographically based, multi-functional and multi-divisional structures, matrix, centralisation and de-centralisation; organisational charts; spans of control; internal and external network structures; flexible working

*Organisational culture:* classification of organisational culture – power culture, role culture, task culture, person culture; cultural norms and symbols; values and beliefs; development of organisational culture

*Diagnosing behavioural problems:* concepts; principles; perspectives; methodology

*Perception:* definition; perceptual selection; perception and work behaviour; attitude; ability and aptitude; intelligence

*Significance and nature of individual differences:* self and self-image; personality and work behaviour; conflict

*Individual behaviour at work:* personality, traits and types; its relevance in understanding self and others

## 2 Understand different approaches to management and leadership

*Development of management thought:* scientific management; classical administration; bureaucracy; human relations approach; systems approach; contingency approach

*Functions of management:* planning; organising; commanding; coordinating; controlling

*Managerial roles:* interpersonal; informational; decisional

*Nature of managerial authority:* power; authority; responsibility; delegation; conflict

*Frames of reference for leadership activities:* opportunist; diplomat; technician; achiever; strategist; magician; pluralistic; transformational; change

## 3 Understand ways of using motivational theories in organisations

*Motivation theories:* Maslow's Hierarchy of Needs; Herzberg's Motivation – Hygiene theory; McGregor's Theory X and Y; Vroom and Expectancy theories; Maccoby, McCrae and Costa – personality dimensions

*Motivation and performance:* rewards and incentives; motivation and managers; monetary and non-monetary rewards

*Leadership:* leadership in organisations; managers and leaders; leadership traits; management style; contingency approach; leadership and organisational culture

*Leadership and successful change in organisations:* pluralistic; transformational; communications; conflict

#### **4 Understand mechanisms for developing effective teamwork in organisations**

*Teams and team building:* groups and teams; informal and formal groups; purpose of teams; selecting team members; team roles; Belbin's theory; stages in team development; team building; team identity; team loyalty; commitment to shared beliefs; multi-disciplinary teams

*Team dynamics:* group norms; decision-making behaviour; dysfunctional teams; cohesiveness

*Impact of technology on team functioning:* technology; communication; change; networks and virtual teams; global and cross-cultural teams

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand the relationship between organisational structure and culture	1.1 compare and contrast different organisational structures and culture 1.2 explain how the relationship between an organisation's structure and culture can impact on the performance of the business 1.3 discuss the factors which influence individual behaviour at work
LO2 Understand different approaches to management and leadership	2.1 compare the effectiveness of different leadership styles in different organisations 2.2 explain how organisational theory underpins the practice of management 2.3 evaluate the different approaches to management used by different organisations
LO3 Understand ways of using motivational theories in organisations	3.1 discuss the impact that different leadership styles may have on motivation in organisations in periods of change 3.2 compare the application of different motivational theories within the workplace 3.3 evaluate the usefulness of a motivation theory for managers
LO4 Understand mechanisms for developing effective teamwork in organisations	4.1 explain the nature of groups and group behaviour within organisations 4.2 discuss factors that may promote or inhibit the development of effective teamwork in organisations 4.3 evaluate the impact of technology on team functioning within a given organisation.

## **Guidance**

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### **Links**

This unit has links to the Management and Leadership NOS.

### **Essential requirements**

There are no essential or unique resources required for the delivery of this unit.

### **Employer engagement and vocational contexts**

Centres should develop links with local businesses. Many businesses and chambers of commerce want to promote local business and are often willing to provide guest speakers, visit opportunities and information about the operation of their businesses.



# Unit 4: Marketing Principles

Unit code:	F/601/0556
QCF level:	4
Credit value:	15 credits
Guided learning hours:	60

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## Aim

This unit aims to provide learners with understanding and skills relating to the fundamental concepts and principles that underpin the marketing process.

## Unit abstract

This is a broad-based unit which gives learners the opportunity apply the key principles of marketing.

Firstly, the unit looks at the definitions of marketing, and what is meant by a marketing orientation and the marketing process.

Next, learners consider the use of environmental analysis in marketing and carry out their own analyses at both macro and micro levels. They will also investigate the importance of market segmentation and how this leads to the identification and full specification of target groups. Learners then consider buyer behaviour and positioning.

The unit looks at the main elements of both the original and the extended marketing mix. This includes an introduction to the concept of the product life cycle, new product development, pricing strategies, distribution options and the promotion mix.

Finally, learners will develop their own marketing mixes to meet the needs of different target groups. This includes considering the differences when marketing services as opposed to goods. A range of other contexts is examined including marketing to businesses instead of consumers and the development of international markets.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the concept and process of marketing
- 2 Be able to use the concepts of segmentation, targeting and positioning
- 3 Understand the individual elements of the extended marketing mix
- 4 Be able to use the marketing mix in different contexts.

## Unit content

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### 1 Understand the concept and process of marketing

*Definitions:* alternative definitions including those of the Chartered Institute of Marketing and the American Marketing Association; satisfying customer needs and wants; value and satisfaction; exchange relationships; the changing emphasis of marketing

*Marketing concept:* evolution of marketing; marketing orientations; societal issues and emergent philosophies; customer and competitor orientation; efficiency and effectiveness; limitations of the marketing concept

*Marketing process overview:* marketing audit; integrated marketing; environmental analysis; SWOT analysis; marketing objectives; constraints; options; plans to include target markets and marketing mix; scope of marketing

*Costs and benefits:* links between marketing orientation and building competitive advantage; benefits of building customer satisfaction; desired quality; service and customer care; relationship marketing; customer retention; customer profitability; costs of a too narrow marketing focus

### 2 Be able to use the concepts of segmentation, targeting and positioning

*Macro environment:* environmental scanning; political, legal, economic, socio-cultural, ecological and technological factors

*Micro environment:* stakeholders (organisation's own employees, suppliers, customers, intermediaries, owners, financiers, local residents, pressure groups and competitors); direct and indirect competitors; Porter's competitive forces

*Buyer behaviour:* dimensions of buyer behaviour; environmental influences; personal variables – demographic, sociological, psychological – motivation, perception and learning; social factors; physiological stimuli; attitudes; other lifestyle and life cycle variables; consumer and organisational buying

*Segmentation:* process of market selection; macro and micro segmentation; bases for segmenting markets, (geographic, demographic, psychographic and behavioural); multi-variable segmentation and typologies; benefits of segmentation; evaluation of segments and targeting strategies; positioning; segmenting industrial markets; size; value; standards; industrial classification

*Positioning:* definition and meaning; influence over marketing mix factors

### 3 Understand the individual elements of the extended marketing mix

*Product:* products and brands – features, advantages and benefits; the total product concept; product mix; product life cycle and its effect on other elements of the marketing mix; product strategy; new product development; adoption process

*Place:* customer convenience and availability; definition of channels; types and functions of intermediaries; channel selection; integration and distribution systems; franchising; physical distribution management and logistics; ethical issues

*Price:* perceived value; pricing context and process; pricing strategies; demand elasticity; competition; costs, psychological, discriminatory; ethical issues

*Promotion:* awareness and image; effective communication; integrated communication process (SOSTT + 4Ms); promotional mix elements; push and pull strategies; advertising above and below the line including packaging; public relations and sponsorship; sales promotion; direct marketing and personal selling; branding, internet and online marketing

*The shift from the 4Ps to the 7Ps:* product-service continuum; concept of the extended marketing mix; the significance of the soft elements of marketing (people, physical evidence and process management)

### 4 Be able to use the marketing mix in different contexts

*Consumer markets:* fast moving consumer goods; consumer durables; coordinated marketing mix to achieve objectives

*Organisational markets:* differences from consumer markets; adding value through service; industrial; non-profit making; government; re-seller

*Services:* nature and characteristics of service products (intangibility, ownership, inseparability, perishability, variability, heterogeneity – the 7Ps); strategies; service quality; elements of physical product marketing; tangible and intangible benefits

*International markets:* globalisation; cultural differences; standardisation versus adaptation; the EU; benefits and risks; market attractiveness; international marketing mix strategies

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand the concept and process of marketing	1.1 explain the various elements of the marketing process 1.2 evaluate the benefits and costs of a marketing orientation for a selected organisation
LO2 Be able to use the concepts of segmentation, targeting and positioning	2.1 show macro and micro environmental factors which influence marketing decisions 2.2 propose segmentation criteria to be used for products in different markets 2.3 choose a targeting strategy for a selected product/service 2.4 demonstrate how buyer behaviour affects marketing activities in different buying situations 2.5 propose new positioning for a selected product/service
LO3 Understand the individual elements of the extended marketing mix	3.1 explain how products are developed to sustain competitive advantage 3.2 explain how distribution is arranged to provide customer convenience 3.3 explain how prices are set to reflect an organisation's objectives and market conditions 3.4 illustrate how promotional activity is integrated to achieve marketing objectives 3.5 analyse the additional elements of the extended marketing mix
LO4 Be able to use the marketing mix in different contexts	4.1 plan marketing mixes for two different segments in consumer markets 4.2 illustrate differences in marketing products and services to businesses rather than consumers 4.3 show how and why international marketing differs from domestic marketing.

## Guidance

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### Essential requirements

There are no essential or unique resources required for the delivery of this unit.

### Employer engagement and vocational contexts

Centres should develop links with local businesses. Many businesses and chambers of commerce want to promote local business and are often willing to provide work placements, visit opportunities, information about businesses and the local business context and guest speakers.

[www.businessbritainuk.co.uk](http://www.businessbritainuk.co.uk)

provides information about business in Britain and has extensive links to other business and business news sites.

[www.fsb.org.uk](http://www.fsb.org.uk)

The Federation of Small Businesses provides information, support and guidance about small businesses in the UK.



# Unit 5: Financial Accounting and Reporting

Unit code:	F/601/0864
QCF level:	4
Credit value:	15 credits
Guided learning hours:	60

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## Aim

In this unit learners will prepare financial statements for different types of business, complying with relevant legal and regulatory provisions and the basic principles of group accounts. Learners will also develop tools for the interpretation of financial statements.

## Unit abstract

It is essential for the success of any business that it has good financial control and record keeping. Lack of effective control, planning and recording can ultimately lead to poor financial results. Owners and managers need to be able to recognise the indications of potential difficulties and take remedial action when required.

The unit considers the current regulations governing financial reporting, the formats of financial statements and the purpose of these statements for different users.

Learners will use records to complete financial statements. They will consider various categories of business income and expenditure and use cash flow forecasts, monitoring and adjusting for the effective management of cash flow. They will measure financial performance using a profit and loss account and balance sheet and analyse the profitability, liquidity and efficiency of a business through the application of ratio analysis.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the regulatory framework for financial reporting
- 2 Be able to prepare financial statements from complete or incomplete records
- 3 Be able to present financial information in accepted formats for publication
- 4 Be able to interpret financial statements.

**\*There is a forbidden combination between unit 5 and Unit 6.**

## Unit content

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### 1 Understand the regulatory framework for financial reporting

*User groups:* owners; managers; employees; suppliers; customers; lenders; government; potential investors; different needs from financial statements

*User needs:* profitability; liquidity; gearing; cash flow; job security; Accounting Standards Board (ASBs) statement of principles; International Accounting Standards Board (IASBs) framework for the presentation of financial statements

*Legislation:* current legislation including Companies Acts 1985, 1989 and 2006; Partnership Act 1890; European directives

*Other regulations:* International Accounting Standards (IASs); International Financial Reporting Standards and the main differences from UK Statements of Standard Accounting Practice (SSAPs) and Financial Reporting Standards (FRSs); The Accounting Standards Board (ASB)

### 2 Be able to prepare financial statements from complete or incomplete records

*Statements:* trial balance; assets, liabilities, income, expenses, capital; profit and loss accounts; balance sheet; cash flow statement; notes to the accounts; statement of recognised gains and losses; international equivalents under the International Accounting Standards (IAS)

*Types of business:* sole trader; partnership; limited company (public and private); manufacturing/service/retail, group of companies

*Preparation:* from trial balance with adjustments e.g. stock, prepayments, accruals, bad debts, depreciation; from incomplete records; basic consolidation of accounts; changes to reporting requirements under the International Accounting Standards (IAS) e.g. statement of comprehensive income, statement of financial position

### 3 Be able to present financial information in accepted formats for publication

*Types of business:* different formats for the businesses described in learning outcome 2 above; annual report

*Formats:* requirements of law and generally accepted accounting practice; changes to reporting requirements under the International Accounting Standards (IAS)

### 4 Be able to interpret financial statements

*Ratios:* calculate ratios to reflect profitability, liquidity, efficiency, gearing, investment; comparison of these ratios both externally (other companies, industry standards) and internally (previous periods); interpretation of results

*Reporting:* present findings in a format appropriate to users; weaknesses and limitations of analysis

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand the regulatory framework for financial reporting	1.1 describe the different users of financial statements and their needs 1.2 explain the legal and regulatory influences on financial statements 1.3 assess the implications for users 1.4 explain how different laws/regulations are dealt with by accounting and reporting standards
LO2 Be able to prepare financial statements from complete or incomplete records	2.1 prepare financial statements for a variety of businesses from a trial balance, making appropriate adjustments 2.1 prepare financial statements from incomplete records 2.3 prepare a consolidated balance sheet and profit and loss account for a simple group of companies
LO3 Be able to present financial information in accepted formats for publication	3.1 explain how the information needs of different user groups vary 3.2 prepare financial statements in a form suitable for publication by a sole trader, partnership and limited company
LO4 Be able to interpret financial statements	4.1 calculate accounting ratios to assess the performance and position of a business 4.2 prepare a report incorporating and interpreting accounting ratios, including suitable comparisons.

## Guidance

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### Links

The unit covers some of the underpinning knowledge and understanding for the NVQ in Accounting. The unit covers topics essential for learners aiming to make a career in this field and who would like to become members of professional accounting bodies.

### Essential requirements

Published financial reports of public limited companies are essential and are available from the companies themselves, or from the free online service provided by *The Financial Times*.

### Employer engagement and vocational contexts

Centres should develop links with local businesses. Many businesses and chambers of commerce want to promote local business and are often willing to provide work placements, visit opportunities, information about businesses and the local business context and guest speakers.

[www.businessbritainuk.co.uk](http://www.businessbritainuk.co.uk)

provides information about business in Britain and has extensive links to other business and business news sites.

[www.fsb.org.uk](http://www.fsb.org.uk)

The Federation of Small Businesses provides information, support and guidance about small businesses in the UK.

# Unit 6: Management Accounting

Unit code:	F/504/2624
QCF level:	5
Credit value:	15
Guided learning hours:	60

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## Unit aim

The aim of this unit is to provide learners with an understanding and ability to use cost and budgeted information to support the management decision process within an organisation.

## Unit abstract

In this unit learners will study how cost data is collected, analysed and processed in to information to support the management decision making process. Learners will also consider different costing and budgeting systems and budgetary planning and control. Learners will look at how to prepare budgets and then compare budgeted figures to actual business results. Once variances have been identified, learners will recommend corrective action to be taken.

Learners will explore, assess and decide upon alternative cost and volume proposals in order to identify maximum profit level.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the budgeting process
- 2 Understand how to use cost information to improve business performance
- 3 Be able to prepare budgets for a business
- 4 Be able to monitor performance against budgets within a business
- 5 Be able to carry out cost-volume-profit analysis for a business

**\*There is a forbidden combination between unit 5 and Unit 6.**

## Unit content

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### 1 Understand the budgeting process

*Purpose of the budgeting process:* benefits of budgeting

*Nature of the budgeting process:* links with organisational objectives and strategy; the budget manual; budgets as planning, coordinating, motivation and control devices; behavioural consequences of budgets; padding the budget; spending to budget; creative budgets.

### 2 Understand how to use cost information to improve business performance

*Different types of costs and classification:* materials; labour; overheads; direct costs; indirect costs; fixed, variable and semi-variable costs.

*Costing methods:* methods e.g. marginal costing, absorption costing, job costing, batch costing, process costing, contract costing, service costing

*Calculation of costs:* techniques e.g. absorption costing, marginal costing, overhead absorption, activity based costing, stock valuation methods

*Analysis of cost data:* data collection for analysis and presentation; preparation of contribution per unit statements; analysis of different scenarios e.g. make or buy-in products for sale, special orders with a fixed buying price

*Cost assessment to maximise profitability:* assessment of how to maximise profit against limiting factors such as restricted output, labour hours

### 3 Be able to prepare budgets for a business

*Budgeting methods:* incremental, zero based; fixed; flexible

*Budget preparation:* limiting key factors; master, subsidiary and functional budgets; preparation of sales budget; debtors' budget; creditors' budget, production cost, raw materials and finished goods budgets

*Cash budget:* composing a cash budget from subsidiary budgets (Receipts and Payments); handling cash deficits through revised payment and receipt arrangements.

### 4 Be able to monitor performance against budgets within a business

*Variations:* types; analysis; calculation; possible causes e.g. variations in materials used, materials purchased, price of materials, amount of labour used, payment of labour, efficiency of labour

*Corrective action:* relevant to business, to the context

*Operating statement:* identification of favourable or adverse variations against budget leading to the compilation of a Cost Reconciliation Statement

*Reporting findings:* identification of favourable or adverse variance from planned expenditure

**5 Be able to carry out cost-volume-profit analysis for a business**

*Alternative cost and volume proposals:* higher costs; lower costs; higher sales volume; lower sales volume

*Break-even analysis:* calculation of break-even point; margin of safety; target profit setting; use of graphs; use of break-even formula

*Recommending action to improve financial performance:* actions to improve profitability e.g. raise price, lower costs

## Learning outcomes and assessment criteria

<b>Learning outcomes</b>		<b>Assessment criteria for pass</b>	
On successful completion of this unit a learner will:		The learner can:	
LO1	Understand the budgeting process	1.1	Explain the purpose of the budgeting process
		1.2	Explain the nature of the budgeting process
LO2	Understand how to use cost information to improve business performance	1.3	Classify different types of cost behaviour in relation to output.
		1.4	Evaluate alternative methods of costing when preparing a profit statement.
		1.5	Calculate costs using a justified choice of technique
		1.6	Analyse cost data using appropriate techniques
		1.7	Assess costs to maximise profitability
LO3	Be able to prepare budgets for a business	1.8	Select appropriate budgeting methods for the needs of a selected business
		1.9	Prepare budgets for the selected business according to the chosen budgeting method
		1.10	Prepare a cash budget for the selected business
		1.11	Assess any changes which should be made to the budget in order to smooth out cash flow variances.
LO4	Be able to monitor performance against budgets within a business	1.12	Calculate variances for a selected business
		1.13	Analyse possible causes of any variances
		1.14	Recommend corrective action for identified variances
		1.15	Prepare an operating statement reconciling budgeted and actual results
		1.16	Report findings to management in accordance with identified responsibility centres
LO5	Be able to carry out cost-volume-profit analysis for a business	1.17	Analyse the effect of alternative cost and volume proposals on profit levels using break-even analysis
		1.18	Recommend justified appropriate action to improve the financial performance of a business

## Guidance

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**This unit is a barred combination with** - *Unit 5: Financial Accounting and Reporting.*

### **Essential requirements**

There are no essential or unique resources required for the delivery of this unit.

### **Employer engagement and vocational contexts**

Centres should develop links with local businesses. Many business and chambers of commerce want to promote local business and are often willing to provide work placements, visit opportunities, information about businesses and the local business context and guest speakers.



# Unit 7: Business Psychology

Unit code:	F/601/1027
QCF level:	5
Credit value:	15 credits
Guided learning hours:	60

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## Aim

The aim of this unit is to develop an understanding of the contribution that psychology makes to the investigation of human behaviour in the workplace and how it is used in key aspects of management.

## Unit abstract

Firstly, learners will explore the major theoretical approaches to the study of human behaviour and how this body of knowledge has been developed through the use of psychological enquiries.

Learners will then study the different types of individual differences and how the tools are used in the workplace to assist in selecting and developing staff.

Learners will explore the impact of change on individuals in the workplace and how change can be managed to reduce negative impact on the organisation and the staff.

The remaining topic is a study of organisational culture and climate and the impact of both on individual and organisational performance.

Overall the unit seeks to combine theoretical study with the application of learning to business organisations.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the different perspectives in occupational psychology
- 2 Understand the role of psychology in the assessment of individual differences in the workplace
- 3 Be able to apply knowledge of impact of change in business
- 4 Understand the impact of culture and climate on performance.

## Unit content

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### 1 Understand the different perspectives in occupational psychology

*Major theoretical approaches in the study of human behaviour:* behaviourist, cognitive, humanistic; their application in the development of occupational psychology

*The contribution of other disciplines:* e.g. sociology and of developments in social psychology is also recognised

*Methods used in psychological enquiry:* key terms: theory, hypothesis, scientific methods, surveys and interviews, participant observation, role play and simulation, methods to be considered with reference to validity and control

### 2 Understand the role of psychology in the assessment of individual differences in the workplace

*Application of assessment of individual differences:* specifically to understanding of learning, memory, attitudes, personality and ability testing

*Use of psychometric testing in assessment and selection:* reliability and validity of psychometric instruments

*Emotional intelligence in assessment and development of staff:* reliability and validity, use of tools

### 3 Be able to apply knowledge of impact of change in business

*Impact of organisational change on individuals:* reactions of individuals to change, process model e.g. John Fisher or Kubler Ross, reasons for individual resistance to change, individual variations in responses to change

*Methods of managing change:* e.g. unfreezing, moving, refreezing (Lewin), resistance to change, actions to overcome resistance, methods of managing change

*Attitudes:* importance of attitudes amongst employees, customers and other stakeholders, attitude formation, attitude change

### 4 Understand the impact of culture and climate on performance

*Culture:* culture as shared values, practices and customs, definition of organisational culture, culture at ascending levels, sub-cultures, professional cultures, organisational culture, industry culture, national culture, models of culture e.g. Trompenaars' Implicit-Explicit factors, Schein's three levels

*Organisational culture:* models of organisational culture, e.g. Handy's power, role, person and task cultures, Johnson and Scholes cultural web, impact of organisational culture on behaviour, culture change programmes

*Climate:* how climate is defined, difference between culture and climate, key aspects of organisational climate e.g. flexibility, responsibility, standards, rewards, clarity, team commitment, impact of management practices on climate, characteristics of a healthy climate, impact of climate on efficiency and effectiveness, methods of improving climate

## Learning outcomes and assessment criteria

<b>Learning outcomes</b>		<b>Assessment criteria for pass</b>	
<b>On successful completion of this unit a learner will:</b>		<b>The learner can:</b>	
LO1	Understand the different perspectives in occupational psychology	1.1	describe the major theoretical approaches
		1.2	assess the contribution of a scientific approach to investigating workplace behaviour
		1.3	assess strengths and limitations of quantitative and qualitative approaches to understanding workplace behaviour
LO2	Understand the role of psychology in the assessment of individual differences in the workplace	2.1	describe the type of individual differences which have been the subject of assessment
		2.2	assess the usefulness of psychometric instruments with particular reference to reliability and validity
		2.3	make justified recommendations for the use of two types of measures of individual differences in making business decisions
LO3	Be able to apply knowledge of impact of change in business	3.1	use theory to explain human reactions to change
		3.2	make justified recommendations for implementing change in a selected organisation
		3.3	make justified recommendations for achieving attitude change amongst a group of stakeholders in a selected organisation
LO4	Understand the impact of culture and climate on performance	4.1	explain how culture influences performance in a selected organisation
		4.2	evaluate the climate for a selected work group
		4.3	make justified recommendations for improving performance for a selected work group.

## Guidance

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### **Essential requirements**

There are no essential or unique resources required for the delivery of this unit.

### **Employer engagement and vocational contexts**

Contact with an occupational psychologist or with a specialist in any of the areas covered by the learning outcomes.

# Unit 8: Business Ethics

Unit code:	M/601/1024
QCF level:	5
Credit value:	15 credits
Guided learning hours:	60

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## Aim

The aim of this unit is to introduce learners to the concept of business ethics and to examine its relevance when considering business objectives and responsibilities.

## Unit abstract

Most businesses today are concerned about the impact of their activities on the business environment. Ethical concerns and greater consumer awareness have resulted in many businesses promoting their social values to ensure competitive advantage. Business ethics embraces corporate social responsibility and ethics relating to accounting practices, marketing, human resource management, and production.

In this unit learners will examine the theoretical roots to the background and growth of business ethics. They will look at the different types of ethical issues a business needs to consider and how the development of ethical values impacts on business behaviour. It is important for learners to appreciate how taking an ethical stance affects businesses both internally and externally, including the effects on stakeholders. Learners will explore the social implications of business ethics for a wide range of business activities that affect the organisation itself and the external environment. This will include the ethical stance behind topical issues such as whistle blowing, employment practices, advertising to children, environmental awareness and using new technologies such as genetic modification of food.

Learners will also examine how an individual's ethical stance impacts on the moral relationship between employer and employee, as well as considering the contractual responsibilities of both parties. This unit will give learners the opportunity to research how a business responds to ethical concerns and assess the extent to which its activities affect its behaviour, whilst ensuring business objectives are met.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand different ethical perspectives in business
- 2 Understand business objectives from an ethical perspective
- 3 Understand ethics in workplace relationships
- 4 Be able to assess a current ethical issue in a business.

## Unit content

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### 1 Understand different ethical perspectives in business

*Ethical perspectives:* deontological and teleological ethical theory; developments from these early approaches e.g. utilitarianism and other consequential approaches; early contributions of Kant and Mill; absolute and relative ethics; Institute of Business Ethics

*Operational activities:* definitions of business ethics; ethical activities; values of businesses; professional ethics

*Ethical issues:* corporate governance; corporate social responsibility; environment; sustainability; human rights; corruption; trading fairly; legal and regulatory compliance; business practices; working conditions; individual ethical responsibilities

### 2 Understand business objectives from an ethical perspective

*Objectives:* corporate governance; corporate social responsibility; environment; sustainability; human rights; corruption; trading fairly; legal and regulatory compliance; business practices; communicating ethical code

*Stakeholders:* stakeholders (owners, employees, customers, suppliers, competitors, citizens); conflicts of interest between stakeholder groups e.g. shareholders versus environmentalists

*Implications:* adapting business behaviour; responding to ethical pressures; implementing ethical practices; influence of stakeholders and pressure groups; impact on competitiveness; reputation; public image; ethical trade; value-added; complying with relevant legislation and codes of practice e.g. UK law, EU law; UN Declaration on Human Rights; UN Global Compact; economic activity e.g. location

### 3 Understand ethics in workplace relationships

*Working relationships:* contractual responsibilities; moral obligations in employer/employee relationships; whistleblowing; the psychological contract; good practice in equal opportunities employment; organisational integrity; working conditions; individual ethical responsibilities; individual ethical behaviour

### 4 Be able to assess a current ethical issue in a business

*Issues:* corporate social responsibility; globalisation; cultural imperialism; ecology; environment; fair trade; corruption; animal testing; child labour; carbon footprint; sources of timber; outsourcing; personal attitudes; whistle blowing; contribution of business to the community; ethics in sales and marketing e.g. spamming, shills, product placement, green washing; ethics in intellectual property e.g. software piracy, counterfeiting, peer-to-peer file sharing

*Implications:* global e.g. environment; corporate e.g. legal and regulatory compliance, policies and practices; individual (employee, consumer)

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand different ethical perspectives in business	1.1 explain the background and development of theoretical ethical approaches 1.2 compare and contrast absolute and relative ethics 1.3 explain the ethical issues which can affect the operational activities of a business
LO2 Understand business objectives from an ethical perspective	2.1 explain how business objectives are affected by ethical considerations 2.2 evaluate the implications for a business and its stakeholders to operate ethically
LO3 Understand ethics in workplace relationships	3.1 assess the role of the company acting as moral agent 3.2 analyse the development of mechanisms for achieving employee involvement and empowerment
LO4 Be able to assess a current ethical issue in a business	4.1 research a current ethical issue affecting a selected business 4.2 report on how the business could improve the ethics of their operations whilst meeting objectives and ensuring good employer/employee relationships 4.3 design a suitable ethical code.

## Guidance

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### Links

The unit has links with the National Occupational Standards in Management and Leadership.

### Essential requirements

For this unit learners must select an organisation and research its approach to ethical issues. They will require access to websites, newspaper articles and journals in order to conduct their research. Topical case studies will be needed to facilitate group work and discussions.

### Employer engagement and vocational contexts

Centres should develop links with organisations such as local businesses, pressure groups and charities that can provide guest speakers to talk on various aspects of business ethics. The centre as an organisation can be a valuable resource both for guest speakers and as a vehicle for topical case studies related to ethical issues. Learners may be able to access information from their part-time jobs related to the organisation's ethical policies.

# Unit 9: Corporate Environmental and Social Management

Unit code:	Y/601/1017
QCF level:	5
Credit value:	15 credits
Guided learning hours:	60

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## Aim

In this unit learners will find that businesses have to do more than make a profit for their owners. They will develop an understanding of sustainable development including the 'triple bottom line' of balancing economic, social and environmental issues and the effects this has on business management.

## Unit abstract

Businesses are increasingly realising that they need to go beyond, within the law, performance of their main functions. This realisation has been given impetus by increased worldwide emphasis on sustainable development.

This unit, after exploring the interactions between human activity and the environment and the development of concepts of sustainable development, allows learners to develop an understanding of the advantages of a proactive response to social and environmental issues and how this can be managed effectively within the organisation.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Know the development of global, European and national policies relating to sustainability
- 2 Understand the commercial case for considering social and environmental matters in business management
- 3 Understand that it may be necessary to reconcile the sometimes conflicting expectations of stakeholders with respect to social and environmental issues
- 4 Understand how businesses can manage their environmental and social performance.

## Unit content

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### 1 Know the development of global, European and national policies relating to sustainability

*Human impacts on the environment:* population, resource depletion, pollution, inequalities

*Global policies:* Montreal Protocol, Brundland report, definitions of sustainable development including Triple Bottom Line, Rio Earth Summit agreements, climate change agreements, UN Environment Programme, Millennium Development Objectives, fair trade

*European policies:* evolution of the EU from its original trading block status, EU Environmental Action Programmes, EU Social Agenda, conflicts between economic and environmental/social policies

*National policies:* This Common Inheritance and 1994 Sustainable Development Strategy, initial Labour Government approach, principles within Securing the Future

### 2 Understand the commercial case for considering social and environmental matters in business management

*Marketing:* presenting a positive image to stakeholders such customers, investors and the wider community; increased loyalty and customer retention

*Cost savings:* identification of opportunities for waste reduction, energy savings, more efficient processes, reduced insurance premiums, less chance of fines for environmental offences, ability to sell carbon credits

*Compliance with legislation:* nature of environmental law, regulators, concepts in environmental regulation, enforcement policy, examples of environmental law

*Being ahead of the field:* having systems in place before they become a legal requirement, opportunity to market expertise gained

### 3 Understand that it may be necessary to reconcile the sometimes conflicting expectations of stakeholders with respect to social and environmental issues

*Customers:* are they really prepared to pay extra for dealing with a socially responsible supplier?

*Shareholders:* role of ethical investment, to what extent are investors prepared to sacrifice short-term dividends for long-term business improvements?

*Pressure groups:* their power as an enemy of business, working with them (sponsorship, promotions, etc)

### 4 Understand how businesses can manage their environmental and social performance

*Peer guidance:* initiatives including Business Charter for Sustainable Development and Centre for Tomorrow's Company

*Degree of commitment:* management involvement, policy setting, formal and informal management systems

*Environmental management:* ISO14001, EMAS, their essential components and integration with wider management systems, waste and energy management

*Environmental Life Cycle Assessment and Environmental Labelling:* ISO14020 and ISO14040 series, EU ECO labelling scheme

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
<p>LO1 Know the development of global, European and national policies relating to sustainability</p>	<p>1.1 outline the background to changing attitudes of the public, politicians and business to the environment since the Second World War</p> <p>1.2 state the Brundland definition of 'sustainable development'</p> <p>1.3 outline the evolving international and UK policies to sustainable development since the Earth Summit of 1992</p> <p>1.4 describe the 'triple bottom line' approach to sustainable development</p>
<p>LO2 Understand the commercial case for considering social and environmental matters in business management</p>	<p>2.1 discuss the role that stakeholders have in persuading business to adopt policies that consider social and environmental matters</p> <p>2.2 explain that there may be cost savings as a result of adopting an environmentally aware approach</p> <p>2.3 illustrate with an example the advantage to a business of considering its environmental or social effects</p>
<p>LO3 Understand that it may be necessary to reconcile the sometimes conflicting expectations of stakeholders with respect to social and environmental issues</p>	<p>3.1 discuss the conflict arising from customers who say that they are concerned about the environmental or social aspects of a product or service they are purchasing, but are not prepared to pay a premium</p> <p>3.2 discuss whether shareholders are prepared to sacrifice short term dividends for developing products or services that have longer-term beneficial social or environmental advantages</p> <p>3.3 discuss the extent to which it is possible to collaborate with pressure groups that seek to change the approach of the business to social and environmental matters</p>

<b>Learning outcomes</b> <b>On successful completion</b> <b>of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO4 Understand how businesses can manage their environmental and social performance	4.1 evaluate sources of guidance available to help businesses improve their social and environmental performance 4.2 review appropriate strategies for management of environmental performance in businesses of different type 4.3 discuss approaches to environmental life cycle assessment and the use of the results in product labelling.

## Guidance

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### Links

The unit has links with *Unit 9: Business Ethics*.

### Essential requirements

There are no essential or unique resources required for the delivery of this unit.

### Employer engagement and vocational contexts

Centres can develop links with local employers. In the context of this unit, it is suggested that contact is established with organisations that have a policy on corporate social responsibility or that have introduced an environmental management policy.

# Unit 10: Analysis of Scientific Data and Information

Unit code:	F/601/0220
QCF level:	4
Credit value:	15
Guided learning hours:	60

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## Aim

This unit develops skills in mathematical and statistical techniques used in the analysis of scientific data, together with an understanding of the limitations in reporting results.

## Unit abstract

In the 21st century, a considerable amount of data analysis is performed by computers. The importance of understanding how and in what circumstances to use individual mathematical and statistical techniques, and the significance of the results, is not diminished by the availability of computational facilities. The primary outcome of scientific experimentation frequently comprises data, the volume of which varies significantly depending on the type of work undertaken. Analysis of the data which is obtained needs to be processed in some way to extract meaning.

This unit aims to develop previous knowledge and understanding gained in learning about scientific data analysis and extend it to a level appropriate for use in industry and research. Starting with the fundamental procedures of displaying information and data to standards expected in the field of science, the majority of the unit focuses on the use of mathematical and statistical techniques in appropriate contexts. Treatment of these techniques is practical rather than theoretical.

Learners will examine how the outcomes of processing are used, in terms of values generated and their associated errors, to generate valid conclusions.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Be able to present information and data to scientific standards
- 2 Be able to process data using numerical analysis
- 3 Be able to process data using statistics
- 4 Understand limitations in concluding results.

## Unit content

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### 1 Be able to present information and data to scientific standards

Presentation of information: target audience; fitness for purpose of media used; clarity of information; communication of work carried out

Display data: tabulation; bar charts; pie charts; frequency polygons; ogives; histograms; scatter diagrams

Graphical methods: linear axes; non-linear axes e.g. logarithmic, exponential; curve fitting; linear regression e.g. least squares method

### 2 Be able to process data using numerical analysis

*Algebraic methods*: transposing equations; linear equations; simultaneous linear equations; quadratic equations; roots of quadratic equations

*Use of calculus*: standard differentiation; first order derivatives of equations; applications of differential equations e.g. reaction rates; standard integration; definite integration; application of definite integration e.g. area under a curve

*Errors in data*: classification of sources of errors e.g. random, systematic, gross; difference between accuracy and precision; handling errors in data processing e.g. absolute, relative, compound

### 3 Be able to process data using statistics

*Descriptive statistics*: measures of central tendency e.g. mode, median, mean; measures of dispersion e.g. variance, standard deviation; coefficient of variation

*Normal distributions*: probability distributions; normal distributions; standardising; tests for normality; percentiles; samples of populations; standard error of the mean; confidence limits

*Hypothesis testing*: null hypothesis; alternative hypothesis

*Statistical tests*: type e.g. z-test, student's t-test, F-test, Pearson's chi-squared ( $\chi^2$ ) test, Pearson's product moment correlation coefficient; significance levels; power of the test; one-tailed and two-tailed

### 4 Understand limitations in concluding results

*Total error in results*: combination of component errors; representation of numbers; round-off errors; truncation errors; level of confidence in results obtained

*Conclusions from the work*: values of measured parameters; validity of hypotheses; support for theoretical models; confirmation of model developed; accuracy; precision of measurements

*Information on the problem studied*: fitness for purpose of the methods used; validity of conclusions; information provided on the systems studied; compatibility of results with those from other sources

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Be able to present information and data to scientific standards	1.1 create a plan for the presentation of scientific information 1.2 display data to scientific standards using planned methods 1.3 carry out graphical methods of displaying scientific data
LO2 Be able to process data using numerical analysis	2.1 perform numerical analysis on scientific data using an algebraic method 2.2 demonstrate numerical analysis using calculus on standard polynomial equations 2.3 evaluate absolute errors in scientific data
LO3 Be able to process data using statistics	3.1 perform descriptive statistics on a sample of continuous scientific data 3.2 demonstrate the nature of normal distributions using a sample of continuous scientific data 3.3 carry out hypothesis testing using standard statistical tests and draw conclusions
LO4 Understand limitations in concluding results	4.1 evaluate the total error in a sample of continuous scientific data 4.2 assess the accuracy of a model using the outcomes of processing carried out on experimental data 4.3 justify the validity of conclusion(s) from the information on a problem studied.

## Guidance

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### Delivery

Delivery must focus on the application of mathematical or statistical techniques in science, rather than on the techniques themselves. Emphasis must be on the selection and implementation of methods appropriate to given scientific contexts, and on the evaluation of the significance of the results and conclusions obtained. Delivery must draw on data from experimental units within the programme of study and use experiments as models for design and analysis. Learners must be taught to use software correctly, and to appreciate both the strengths and limitations of the methods used.

Delivery teams should analyse the mathematical requirements of their programmes and select the set of techniques learners will need to derive meaning from the information and data they will encounter during their studies.

### Assessment

Evidence for achieving this unit must be in a scientific context. Scientific terminology, protocols and documentation should be used where appropriate.

Learning outcome 1 involves presenting information and data to standards expected in the science industry.

Learning outcomes 2 and 3 involve the mathematical and statistical techniques commonly used in the process of scientific data analysis. Emphasis must be on the accurate application of the methods covered, rather than on demonstrating understanding of the mathematical concepts. Evidence should include case studies or experimental studies, where appropriate.

Learning outcome 4 involves the generation of a formal conclusion based on the outcome of the data analysis. Evidence may be integrated with evidence from the other three learning outcomes.

### Resources

Learners will need access to IT facilities and appropriate software to enable them to tackle realistic problems. Many of the operations relevant to applied science programmes can be implemented using a generic spreadsheet package (such as Microsoft Excel). Ideally, this will be supplemented by dedicated mathematical or statistical packages, for example Minitab, PASW Statistics or MATLAB.

### Employer engagement and vocational contexts

Learners will benefit from visits to industrial and research facilities to observe practical applications of data analysis, or to gain access to learning materials.

# Unit 11: Pharmacological Principles of Drug Actions

Unit code:	K/601/0227
QCF Level 5:	BTEC Professional
Credit value:	15
Guided learning hours:	60

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## Unit aim

This unit enables learners to analyse clinical data and understand the pharmacokinetic processes of diseases affecting the nervous system and the subsequent effects of drug treatments.

## Unit abstract

This unit covers key areas of pharmacology enabling learners to gain an understanding of the principles of drug action and the interactions that occur between chemical substances and living organisms. Prior knowledge and understanding of human physiology are essential.

The unit introduces learners to pharmacokinetic principles allowing them to practically analyse and calculate clinical data including rates of absorption and excretion. Learners will then explore factors which affect pharmacokinetic processes and the drug/food and drug/drug interactions which arise from pharmacokinetic mechanisms.

Learners will gain an understanding of the transmission of nerve impulses and the effects of drugs on transmission. Finally, they will study the function of the immune system, gaining an appreciation of the drugs that stimulate and suppress it.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Be able to analyse and calculate clinical data
- 2 Understand factors that affect pharmacokinetic processes
- 3 Understand the transmission of nerve impulses, diseases that affect transmission and their modification by drugs
- 4 Understand the function of the immune system and how drugs may affect it.

## Unit content

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### 1 Be able to analyse and calculate clinical data

*Pharmaceutical data:* graphical representations of plasma concentration against time for a drug administered by iv bolus, single oral dose, multiple oral dose, continuous iv infusion

*Rates of absorption and excretion:* the use of semi-log plots; calculation of rates of absorption and excretion, half-life, fraction absorbed and total amount absorbed

### 2 Understand factors that affect pharmacokinetic processes

*Absorption, distribution, metabolism and excretion:* factors eg food, diseases, age, other drugs, blood flow, lipid content, renal and hepatic impairment

*Dosage regime:* terminology; effect of factors eg food, disease, age, other drugs, blood flow, lipid content; recommendations used in the British National Formulary (BNF)

*Interactions:* drug/food and drug/drug interactions arising from pharmacokinetic mechanisms

### 3 Understand the transmission of nerve impulses, diseases that affect transmission and their modification by drugs

*Transmission of nerve impulses:* the structure and function of nerves of the central nervous system, the autonomic nervous system and voluntary nerves; movement of ions in the transmission process; the synapse; receptors; role of transmitter substances; enzymic breakdown; re-uptake

*Effects of drugs:* on transmission and treatment of disease; central nervous system eg Parkinson's disease, depression; voluntary nervous system eg myasthenia gravis; other disease states or treatments which involve transmitter substances or their modification eg use of beta-blockers, beta-receptor agonists, anticholinergics

### 4 Understand the function of the immune system and how drugs may affect it

*Defence mechanism:* non-specific and specific mode of action of antigens; vaccines and immunosuppressant drugs in relation to specific and non-specific defence mechanisms

*Use of drugs:* immune system stimulation and suppression antigens; corticosteroids; cyclosporin; use in autoimmune diseases; organ transplants and immunocompromised patients

## Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

**On completion of this unit a learner should:**

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
1 Be able to analyse and calculate clinical data	1.1 plot pharmacokinetic data for given drug doses  1.2 calculate rates of absorption and excretion, half-life, total amount absorbed and fraction absorbed
2 Understand factors that affect pharmacokinetic processes	2.1 discuss factors affecting absorption, distribution, metabolism and excretion of drugs  2.2 explain how factors influence dosage regimes, including those for patients with renal and hepatic impairment  2.3 explain types of drug interactions arising from pharmacokinetic mechanisms
3 Understand the transmission of nerve impulses, diseases that affect transmission and their modification by drugs	3.1 explain key stages in the transmission of nerve impulses  3.2 explain the effects of drugs on transmission of nerve impulses and the treatment of disease
4 Understand the function of the immune system and how drugs may affect it	4.1 explain functions of defence mechanisms  4.2 discuss the use of drugs that stimulate and suppress the immune system

## Essential guidance for tutors

### Essential requirements

#### Delivery

The delivery of pharmacokinetic principles (learning outcome 1) could start with a review of graph plotting, and the use of semi-log paper. Derivation of equations could be illustrated practically using examples. Software could be used to illustrate trends, patterns and exceptions.

To explore the four areas of absorption, distribution, metabolism and excretion, (learning outcome 2) learners, in groups, could draw on a flipchart the processes they think happen following the ingestion of for example paracetamol tablets. Learners could then use this example as a basis for a thorough coverage of factors affecting pharmacokinetic processes.

Learners could individually research BNF dosage regimes for common drugs, for example via a group discussion of a commonly used antibiotic, and then share this information with the class.

Drug interactions can be delivered through a question and answer session, as learners should now have the understanding to deduce the reasons for many interactions. A class exercise using information sources could be carried out. Learners need to explain three types of drug interactions arising from pharmacokinetic mechanisms.

For learning outcome 3, learners could produce and present a scientific poster to illustrate the processes involved in the transmission of nerve impulses. DVDs/videos could be used to illustrate the effects drugs have on the transmission of diseases such as Parkinson's and the treatment of diseases.

DVDs/videos are available which cover the function of the immune system and autoimmune disease. Learners could prepare and deliver a presentation to highlight the use of drugs that stimulate and suppress the immune system, supported by a group question and answer session.

#### Resources

Learners will need access to library and information technology resources, tutorial and technical support, molecular models and laboratory facilities to demonstrate experiments.

#### Employer engagement and vocational contexts

Learners would benefit from visits to industrial laboratories to observe practical diagnostic techniques in operation.

**Assessment**

Evidence for learning outcome 2 may be a report reviewing factors affecting absorption, distribution, metabolism and excretion of drugs, short answers to problems based on clinical data, suggested dosage regimes and written explanations for a range of drug/food and drug/drug interactions. Evidence for learning outcome 3 may be an annotated diagram of the theory of nerve transmission and the role of transmitter substances. Evidence may also be in the form of a written account of disease states and their treatment. Evidence for learning outcome 4 may be presentations on the use of drugs that act by modifying the immune system.



# Unit 12: Medicinal Chemistry

Unit code:	R/601/0416
QCF Level 5:	BTEC Professional
Credit value:	15
Guided learning hours:	60

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## Unit aim

This unit enables learners to gain an understanding of the factors relating to drug structure and design, pharmacokinetics and pharmacodynamics and biochemical responses of drug treatment.

## Unit abstract

This unit develops principles of medicinal and clinical chemistry associated with drug design and structure together with biochemical aspects of drug action. Structure-activity relationships and computer-aided drug design are considered as aspects contributing to drug discovery and design. The role of combinatorial chemistry in drug synthesis is also considered.

Effectiveness of drug structures is assessed in relation to the role of enzymes and receptors as drug targets and the mechanisms by which they bind drugs. The unit develops the principles of pharmacokinetics and pharmacodynamics as a method of rationalising the evaluation of drugs in terms of route administration, metabolism, excretion and biochemical response.

The unit concludes by exploring the effect of selected chemicals on the body thus enabling learners to apply the principles established in the earlier parts of the unit.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the role of enzymes and receptors as drug targets
- 2 Understand the pharmacokinetic and pharmacodynamic behaviour of drugs
- 3 Understand the stages of drug discovery and design
- 4 Understand the role of biologically active molecules in biochemical systems.

## Unit content

### 1 Understand the role of enzymes and receptors as drug targets

*Drug targets:* enzymes; inhibitors (reversible, non-reversible, competitive, non-competitive); medicinal uses of enzyme inhibitors against micro-organisms, viruses and the body's own enzymes; receptors; classification of main receptor types; signal transduction systems

*Drug receptor binding interactions:* ionic bonding; hydrogen bonding; Van der Waals interactions; dipole-dipole interactions; covalent bonding; functional groups

*Enzyme inhibition:* competitive and non-competitive enzyme kinetics; Michaelis-Menton, Lineweaver-Burk plots

*Receptors:* receptor types; agonists; antagonists; tolerance and dependence; affinity; efficacy; potency

### 2 Understand the pharmacokinetic and pharmacodynamic behaviour of drugs

*Influence of route of administration on systemic toxicity:* pharmacokinetics and pharmacodynamics (absorption, distribution, metabolism, excretion, administration, dosing, drug interactions); relationships to toxicity tests; evaluation of the principles of pharmacological toxicity

*Drug metabolism:* metabolic sites; common pathways; factors affecting drug metabolism (dose level, routes of administration, sex related differences, age, disease, drug interactions, genetics)

*Methods of biological evaluation of drugs:* toxicity testing; evaluation of new drug substances; in vitro and in vivo evaluation of drugs, ligand binding; agonist and antagonist activity, tissue studies; formulation and chemical development; toxicity versus safety theoretical concepts

*Abnormal responses:* immune mechanisms; haptens; allergic reactions; activation and suppression of the immune and sensitising systems

### 3 Understand the stages of drug discovery and design

*Designing a new drug:* choice of disease, choosing a suitable drug target, finding a lead compound; screening natural products, development of existing drugs

*Structure-activity relationships:* identification of functional groups; potential binding sites; identification of pharmacophore; variation of substituents; quantitative structure-activity relationships (QSAR); partition coefficients, lipophilicity; computer-aided drug design

*Combinatorial chemistry:* basic concepts; advantages compared to traditional synthesis; design of syntheses; combinatorial libraries; outline of general techniques; solid support method, parallel synthesis, solution synthesis

#### 4 Understand the role of biologically active molecules in biochemical systems

*Biologically active molecules:* development and action of the penicillins; penicillin antibiotic resistance; development and action of angiotensin converting enzyme (ACE) inhibitors; principles and examples of anticancer agents; antiviral drugs and acquired immune deficiency syndrome (AIDS) virus; cellular production and role of nitric oxide

*Clinical toxicology:* acute toxicity, chronic toxicity, teratogenic tests, reproduction tests, mutagenicity, chemical-induced illness

*Clinical toxicity:* risk assessment; hazard versus risk benefits

## Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

**On completion of this unit a learner should:**

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
1 Understand the role of enzymes and receptors as drug targets	1.1 explain the role of enzymes and receptors as drug target sites 1.2 explain drug-receptor binding interactions 1.3 distinguish between competitive and noncompetitive enzyme inhibition 1.4 explain the relationship between receptors and drug affinity, efficacy and potency
2 Understand the pharmacokinetic and pharmacodynamic behaviour of drugs	2.1 discuss the influence of route of administration on systemic toxicity 2.2 review pathways of drug metabolism 2.3 explain methods of biological evaluation of drugs 2.4 explain abnormal responses to drugs
3 Understand the stages of drug discovery and design	3.1 discuss the issues for consideration when designing a new drug 3.2 explain the concepts of structure-activity relationships with respect to drug design 3.3 explain the role of combinatorial chemistry in drug synthesis and development

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
4 Understand the role of biologically active molecules in biochemical systems	4.1 discuss the development and role of selected biologically active molecules 4.2 explain clinical toxicological terms citing suitable examples 4.3 explain the principles of clinical toxicity

## **Essential guidance for tutors**

### **Essential requirements**

#### **Delivery**

The unit should be delivered in a manner so that it emphasises the chemical principles involved in drug action and design. Wherever possible chemical structures or part structures in the form of functional groups, rather than descriptive terminology, must be used to illustrate concepts such as binding, drug metabolism and structure-activity relationships. Throughout the unit specific examples of drugs or case studies must be used to illustrate principles and conceptual aspects of the unit content.

#### **Resources**

Learners will need access to library and information technology resources, tutorial and technical support, molecular models and laboratory facilities.

#### **Employer engagement and vocational contexts**

Learners will benefit from visits to pharmaceutical laboratories to observe research and development procedures in operation.

#### **Assessment**

Where possible, assessments must be based on the application of principles to specific examples of drugs. Learners must be encouraged to undertake literature searches in relation to the development, testing and action of named drugs. Structure-activity relationships and enzyme kinetics must be assessed in a quantitative as well as a qualitative manner.

# Unit 13: Environmental Monitoring and Analysis

Unit code:	Y/601/0238
QCF Level 5:	BTEC Professional
Credit value:	15
Guided learning hours:	60

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## Unit aim

This unit provides learners with an understanding of natural environmental cycles and the influence of pollutants on ecosystems. The sources and effects of environmental pollutants together with techniques of sampling and chemical analysis are examined.

## Unit introduction

The analysis of the natural environment and the impact of human activity on it are central to this unit. Through studying this unit learners will learn about the environment close to where they live and work, as well as the global systems we all depend on.

Learners will learn how the balance of the natural environment relies on transfer mechanisms to cycle and purify its components. The complex nature of the interactions involved and the influence of pollutants on ecosystems are covered.

The importance of fossil fuel combustion as a source of pollution is studied and the effects on ecosystems assessed.

Following the initial introduction to the natural environment, and the potential pollutants within it, learners will plan and carry out an analysis of appropriate material from a selected site. Learners will assess the suitability of a sampling site and select material for analysis and analytical techniques under guidance from their tutor. This practical study allows for an iterative approach to the development of suitable sampling and analytical procedures.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the major strategies for conservation of resources
- 2 Understand the causes, effects and the control of pollution
- 3 Understand global environmental issues
- 4 Understand how environmental legislation may be put into practice.

## Unit content

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### 1 Understand the major strategies for conservation of resources

*Statutory designations:* designated areas eg Sites of Special Scientific Interest (SSSI) (biological and geological), Special Areas of Conservation (SAC), Ramsar sites, national and local nature reserves and Marine Protected areas; establishment of designated areas; design of designated areas; development of designated areas; management of designated areas

*Processes:* guidelines for selection eg geological conservation review, notification, consultation and confirmation with respect to Sites of Special Scientific Interest, identification of SACs in line with Habitats Directive, government approval of SACs, adoption of UK list of SACs by European Union, criteria in Ramsar convention

*Resource recycling:* recycling eg glass, aluminium, paper, wood, plastic; the strategies employed by local councils; packaging waste regulations eg Producer Responsibility Obligations (Packaging Waste) Regulations 2007; compliance schemes for relevant packaging waste regulations eg Valpak

*Land resource management:* relevant legislation eg Planning and Compulsory Purchase Act 2004; the role of the spatial planning system in conserving the natural environment and delivering high quality environmentally sustainable development; the technical and management issues in the remediation and use of brownfield land; local authority registers of contaminated land

### 2 Understand the causes, effects and the control of pollution

*Pollutants:* common air pollutants eg sulfur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), low level ozone, benzene, 1,3 butadiene, lead, PM<sub>10</sub>; sources of the common air pollutants eg transport, energy use, manufacturing industry; List 1 aquatic pollutants from the Dangerous Substances Directive; sources of List 1 aquatic pollutants; agricultural aquatic pollutants eg silage run off, nitrates, phosphates, slurry, sheep dip

*Effects on organisms within an ecosystem:* eutrophication; increase in chemical oxygen demand; effects of sulfur dioxide on vegetation

*Current relevant strategies:* Environment Act 1995; National Air Quality Strategy; National Air Quality Standards and Objectives; National Atmospheric Emissions Inventory; European Pollutant Emission Register (EPER); Environmental quality standards; river ecosystem classifications bio-monitoring; indicator species; keystone species

*Control methods:* legislation eg Integrated Pollution Prevention Control (IPPC), The Water (Prevention of Pollution) (Code of Good Agricultural Practice) (England) Order 2009; identification of areas at risk eg Air Quality Management Areas (AQMA), Nitrate Vulnerable Zones; best available techniques; best available techniques reference documents; specific techniques eg flue gas desulfurisation

### 3 Understand global environmental issues

*Climate change:* greenhouse gases and their atmospheric effects; economic and social consequences of global warming; global initiatives eg the Kyoto Treaty, Copenhagen Climate Summit; ozone depletion and the Montreal protocol

*Carbon trading:* EU Emission Trading (ETS) Scheme; Clean Development Mechanism; carbon markets

*Energy security:* peak oil; biofuels; carbon capture and storage; clean coal; nuclear power, renewable energy sources; energy security; the UK Low Carbon Transition Plan

*Pressure groups:* national or international eg Friends of the Earth, World Wide Fund for Nature (WWF), Greenpeace

*Global campaigns:* campaign of topical interest eg carbon footprint, lifecycle analysis, food miles, sustainable transport, saving the rainforests, limiting ozone depletion (Montreal Protocol)

### 4 Understand how environmental legislation may be put into practice

*Legislation:* UK/EU eg the Environmental Protection Act 1990, Environmental Permitting Regulations 2007, Environmental Liability Directive, Waste Framework Directive, Batteries Directive

*Operation of environmental permitting regulations:* managing activities; suitable environmental management system; use of competent persons; accident management plan; permit conditions/rules; waste acceptance; point source emissions to air, water and land; fugitive emissions; odour; noise and vibration; monitoring; records; reporting/notification

*Waste management:* environmental permitting regime (England and Wales) eg pollution prevention and control, waste management licenses, waste carriers and broker registrations, water discharge consents, groundwater authorisations; waste management duty of care; Pollution Prevention Guidelines

*Environmental management systems:* structured and documented environmental management systems (EMS) to manage environmental performance and responsibilities; EMS certification, ISO 14001; the EU Eco-Management and Audit Scheme (EMAS); BS 8555 (a British Standard for Small and Medium Enterprises (SMEs))

## Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

**On completion of this unit a learner should:**

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand the major strategies for conservation of resources	1.1 discuss current national and international statutory designations protecting the UK's natural environment 1.2 explain the processes involved in the establishment of a designated area for conservation 1.3 discuss how the UK reduces waste and promotes recycling 1.4 discuss issues involved in land resource management
LO2 Understand the causes, effects and the control of pollution	2.1 discuss pathways of named pollutants from source to receptor 2.2 assess the effects of a named pollutant on organisms within an ecosystem 2.3 discuss strategies used for monitoring pollutants in water and air emissions 2.4 assess methods for controlling pollution
LO3 Understand global environmental issues	3.1 evaluate evidence for the contribution of human activities to climate change 3.2 review international carbon trading 3.3 discuss environmental aspects of the UK's energy security policy 3.4 assess the role of an environmental pressure group in a global environmental campaign

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO4 Understand how environmental legislation may be put into practice	4.1 review current UK/EU/ environmental protection legislation 4.2 explain operation of the Environmental Permitting Regulations 4.3 explain how businesses comply with their duty of care for waste management 4.4 assess, using case studies, the effectiveness of using an environmental management system.

## Essential guidance for tutors

### Links

This unit has particular links with the following units within this qualification:

- *Unit reference number F/601/0220: Analysis of Scientific Data and Information*
- *Unit reference number K/601/0289: Environmental Management and Conservation.*

### Essential requirements

#### Delivery

Learning outcome 1 covers the complexity of the natural environment and natural material cycles. The nature of soil types including acid-base character and ion exchange effects must be stressed.

Learning outcome 2 can be achieved through case studies and industrial visits. Flow diagrams for the selected industrial or agricultural process, with quantification of the potential pollutant and waste flows, could be produced before the visit to provide a greater appreciation of the emphasis on environmental protection in modern industrial processes. Learners in industry must be encouraged to investigate environmental protection measures at their place of work.

Learning outcomes 3 and 4 are essentially practical and could be delivered using a project-based approach. The intention is to follow a given analysis from selecting an appropriate site through planning sampling regimes to applying suitable chemical analysis to provide an accurate and reproducible result. If group work is used, tutors must ensure that each individual learner provides sufficient evidence of meeting the assessment criteria on an individual basis. Learners may be guided in selecting an appropriate analyte depending on the analytical facilities available at the centre.

Visits to commercial analytical laboratories would be useful in allowing learners to observe quality control systems in practice and appreciate the issues raised by a delay between sampling and analysis.

#### Resources

Learners will need access to appropriate laboratory facilities and technical support. The apparatus and instrumentation required will depend on local resources and the analytical methods chosen. Suitable local sampling sites should be identified to support laboratory work. General library facilities, including internet access, will also be needed. Relevant periodicals would be beneficial for resource-based research work.

## **Employer engagement and vocational contexts**

Learners would benefit from visits to industrial settings where effluent treatment and environmental monitoring can be observed. Visits would enable learners to appreciate how reducing environmental impact is central to modern industrial design and processing.

## **Assessment**

Learning outcome 1 involves the general principles of biogeochemical cycles and as with learning outcome 2, evidence could be generated from case studies. Learning outcomes 3 and 4 involve planning and practical work and could be suitable for group or individual projects.



# Unit 14: Environmental Management and Conservation

Unit code:	K/601/0289
QCF Level 5:	BTEC Professional
Credit value:	15
Guided learning hours:	60

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## Unit aim

This unit reviews environmental issues such as conservation sites, recycling and land reclamation. Learners gain an understanding of the causes and effects of pollution, global environmental issues, renewable energy, and the work of environmental pressure groups.

## Unit abstract

Learners will have the opportunity to explore environmental issues in their own community. To make the most of this, learners may visit Sites of Special Scientific Interest, recycling facilities, brownfield land that is being reused, and local industry. Learners will investigate the origins and effects of pollutants and study how pollution may be controlled.

Evidence for human impact on global climate change and international initiatives to combat the effects through carbon trading will be explored. The work of environmental pressure groups in bringing environmental issues into the public domain will be investigated.

Finally, learners will study legislation, particularly in relation to waste, in order to gain an understanding of the quality of the information that government provides to business. Case studies will be used to assess the effectiveness of environmental management systems.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand how biogeochemical cycles result in the transfer of substances between components of ecosystems
- 2 Understand the sources and effects of environmental pollutants
- 3 Be able to apply sampling methods appropriate to an analyte
- 4 Be able to determine the concentration of analytes in samples.

## Unit content

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### 1 Understand how biogeochemical cycles result in the transfer of substances between components of ecosystems

*Abiotic components of biogeochemical cycles:* hydrosphere; lithosphere; atmosphere; soil structure and composition; atmospheric transport; aquatic systems

*Mechanisms of substance transfer:* water cycle; nutrient cycles (carbon, nitrogen, oxygen, phosphorus, sulfur); non-nutrient transfer; by organic species eg PCBs, DDT, hydrocarbons; metals eg lead, cadmium, mercury

*Influences on substance cycling:* abiotic components of ecosystems; physical properties and composition of aquatic habitats, soil and air; biotic components of ecosystems; feeding, uptake from soil, assimilation, excretion, decomposition

### 2 Understand the sources and effects of environmental pollutants

*Sewage treatment:* composition of raw sewage; role and effect of primary, secondary and tertiary treatment processes; typical process equipment

*Industrial sources of pollutants:* sources of water, air and soil pollutants eg petrochemical processing, power generation, mining, manufacturing

*Agricultural sources of pollutants:* fertilisers; herbicides; pesticides; animal wastes; methane; cleaning agents

*Fossil fuel combustion products:* gas, petrol, oil and coal combustion products; environmental impact of carbon, nitrogen and sulfur oxides; photochemical smog

*Effect of pollutants on ecosystems:* toxicity; bioconcentration; biodiversity effects; viral and bacterial pathogens; acidification; greenhouse effect

### 3 Be able to apply sampling methods appropriate to an analyte

*Selection of sampling location:* appropriate site eg local, field trip, industrial, agricultural; type of pollutant (water, soil, air); accessibility; health and safety considerations

*Design of sampling protocol:* protocol related to sample type eg water volume, flow, time, container volume, storage and stabilisation, analyte mobility, analyte stability

*Quality control:* planning for sampling; random sampling; internal standards

*Environmental sampling:* implementation of sampling protocol; iterative cycle for improvement

### 4 Be able to determine the concentration of analytes in samples

*Planning:* selection of analytical technique related to analyte eg pre-treatment, extraction, dissolution, spectrometry, chromatography, titration, electrochemical, voltammetry, fluorescence, chemiluminescence

*Determination of analyte concentration:* implementation of planned analysis; evaluation of results; alteration of plan; repeat of sampling and analysis

*Report on analytical procedure:* accuracy; reliability; statistical analysis; suggestions for future work

*Maximum permitted levels:* related to selected analyte eg total organic carbon, nitrate, nitrite, ammonia, biochemical oxygen demand, pH, particulates, suspended solids, heavy metals

## Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

**On completion of this unit a learner should:**

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand how biogeochemical cycles result in the transfer of substances between components of ecosystems	1.1 discuss the abiotic components of biogeochemical cycles 1.2 explain mechanisms by which substances are transferred between environmental components 1.3 explain the abiotic and biotic factors that influence the cycling of substances
LO2 Understand the sources and effects of environmental pollutants	2.1 explain the key stages in sewage treatment 2.2 analyse industrial processes as sources of pollutants 2.3 compare agricultural processes as sources of pollutants 2.4 discuss the environmental impact of fossil fuel combustion products 2.5 assess the effects of selected pollutants on ecosystems
LO3 Be able to apply sampling methods appropriate to an analyte	3.1 select a suitable location for sampling 3.2 design a sampling protocol for specified analytes at a location 3.3 implement quality control criteria for a sampling regime 3.4 carry out appropriate environmental sampling, using safe practices
LO4 Be able to determine the concentration of analytes in samples	4.1 plan analyses appropriate for a specified analyte 4.2 determine the concentration of an analyte in a sample 4.3 report on the accuracy of the results of an analytical procedure 4.4 relate the concentration of an analyte to the maximum permitted levels.

## Essential guidance for tutors

### Links

This unit has particular links with the following units within this qualification:

- *Unit reference number F/601/0220: Analysis of Scientific Data and Information*
- *Unit reference number Y/601/0238: Environmental Monitoring and Analysis*

### Essential requirements

### Delivery

Current legislation and initiatives are mentioned in the unit content but these must be replaced by suitable alternatives if they become out of date. In all cases the latest legislation must be used. Where possible, learners should visit sites and organisations and the use of visiting speakers is strongly encouraged. Learning outcome 1 covers Sites of Special Scientific Interest, recycling and waste minimisation and reclamation of brownfield land. Ideally, learners should visit a Site of Special Scientific Interest, a brownfield site that is being put to a new use and a council recycling facility. Input from experts at the site will deepen learner understanding. If this is not possible, learners must be encouraged to find out about relevant sites in their area.

Learning outcome 2 has a particularly wide scope, which has been limited to consideration of air and water (and not land). It could be delivered by introducing the general content and then focusing on issues of particular relevance to the centre's location. Centres in a predominantly rural area, for example, may wish to concentrate on aquatic agricultural pollution, such as nitrate pollution. Other centres in industrial areas may choose to consider the effects of sulfur dioxide in great detail.

For learning outcome 3, there is a great deal of information about global warming available. One strategy would be to select a number of documents from a variety of sources for learners to study. This would allow them to evaluate the information in the evidence, and also the quality of the evidence, and to decide whether they would need more/different evidence to be able to draw firm conclusions. Possible strategies for the UK's energy security policy must be discussed and the Government's preferred options identified. The environmental implications of alternative forms of energy must be explored. This could involve analysis of numerical data.

Learning outcome 4 gives learners the chance to explore the value of Netregs, the government website dealing with environmental legislation. This will support the first three assessment criteria.

### Resources

Learners must have access to real case studies and/or real-life situations. Access to current legislation and initiatives is also essential.

## **Employer engagement and vocational contexts**

Learners would benefit from visiting Sites of Special Scientific Interest, recycling facilities and reclaimed land. The causes, effects and control of pollution may be assessed in a local context. It is essential to have industrial input to assess the effectiveness of using an environmental standard. Guest speakers from industry and other groups would enhance delivery.

## **Assessment**

For learning outcome 1, learners may look at current national and international statutory designations protecting the UK's natural environment in general but go into more depth to address the unit content in relation to the processes involved in setting up one of these sites. Where possible, learners should visit a local site. Learners must address the unit content in outlining the reclamation of brownfield land, using a local case study where possible.

For learning outcome 2, the focus needs to be limited to allow learners to gain a depth of understanding. Particular pollutants need to be selected with reference to the pathways from source to receptor. Pollutants need to be chosen carefully in order to be relevant and to allow learners to select good quality information. In discussing strategies used for monitoring pollutants, emphasis must be on the overview of data taken by Government agencies and local authorities, rather than on specific analytical techniques. Methods of controlling one or more pollutants must be covered. This must involve specific pollution abatement techniques and also the supporting legislation. Once again, the focus could be different, for example industrial or agricultural.

For learning outcome 3, learners could source articles about global warming. They could assess the quality of the articles, the quality of the evidence and identify further desirable work in this area. Learners must review the nature and extent of international carbon trading. Government information on future energy supplies is available. The focus is not only on the nature of the energy security policy but the implications for the environment. Learners must identify a high profile global campaign, which a pressure group is/has been involved with and assess the role of the pressure group in that campaign. Learning outcome 4 gives learners scope to present material on legislation that they have obtained from Netregs or other sources. Learners must assess the features of an environmental management system and how it operates. Additionally, case study information from industry is required about the effectiveness of using an environmental management system. ISO 14000 is the most common environmental management system. However, learners may write about the effectiveness of others if they have suitable industrial input.

# Unit 15: Analytical Methods for Engineers

Unit code:	A/601/1401
QCF level:	4
Credit value:	15
Guided Learning Hours:	60

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## Aim

This unit will provide the analytical knowledge and techniques needed to carry out a range of engineering tasks and will provide a base for further study of engineering mathematics.

## Unit abstract

This unit enables learners to develop previous mathematical knowledge obtained at school or college and use fundamental algebra, trigonometry, calculus, statistics and probability for the analysis, modelling and solution of realistic engineering problems.

Learning outcome 1 looks at algebraic methods, including polynomial division, exponential, trigonometric and hyperbolic functions, arithmetic and geometric progressions in an engineering context and expressing variables as power series.

The second learning outcome will develop learners' understanding of sinusoidal functions in an engineering concept such as AC waveforms, together with the use of trigonometric identities.

The calculus is introduced in learning outcome 3, both differentiation and integration with rules and various applications.

Finally, learning outcome 4 should extend learners' knowledge of statistics and probability by looking at tabular and graphical representation of data; measures of mean, median, mode and standard deviation; the use of linear regression in engineering situations, probability and the Normal distribution.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Be able to analyse and model engineering situations and solve problems using algebraic methods
- 2 Be able to analyse and model engineering situations and solve problems using trigonometric methods
- 3 Be able to analyse and model engineering situations and solve problems using calculus
- 4 Be able to analyse and model engineering situations and solve problems using statistics and probability.

## Unit content

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### 1 Be able to analyse and model engineering situations and solve problems using algebraic methods

*Algebraic methods:* polynomial division; quotients and remainders; use of factor and remainder theorem; rules of order for partial fractions (including linear, repeated and quadratic factors); reduction of algebraic fractions to partial fractions

*Exponential, trigonometric and hyperbolic functions:* the nature of algebraic functions; relationship between exponential and logarithmic functions; reduction of exponential laws to linear form; solution of equations involving exponential and logarithmic expressions; relationship between trigonometric and hyperbolic identities; solution of equations involving hyperbolic functions

*Arithmetic and geometric:* notation for sequences; arithmetic and geometric progressions; the limit of a sequence; sigma notation; the sum of a series; arithmetic and geometric series; Pascal's triangle and the binomial theorem

*Power series:* expressing variables as power series functions and use series to find approximate values eg exponential series, Maclaurin's series, binomial series

### 2 Be able to analyse and model engineering situations and solve problems using trigonometric methods

*Sinusoidal functions:* review of the trigonometric ratios; Cartesian and polar coordinate systems; properties of the circle; radian measure; sinusoidal functions

*Applications:* angular velocity, angular acceleration, centripetal force, frequency, amplitude, phase, the production of complex waveforms using sinusoidal graphical synthesis, AC waveforms and phase shift

*Trigonometric identities:* relationship between trigonometric and hyperbolic identities; double angle and compound angle formulae and the conversion of products to sums and differences; use of trigonometric identities to solve trigonometric equations and simplify trigonometric expressions

### 3 Be able to analyse and model engineering situations and solve problems using calculus

*Calculus:* the concept of the limit and continuity; definition of the derivative; derivatives of standard functions; notion of the derivative and rates of change; differentiation of functions using the product, quotient and function of a function rules; integral calculus as the calculation of area and the inverse of differentiation; the indefinite integral and the constant of integration; standard integrals and the application of algebraic and trigonometric functions for their solution; the definite integral and area under curves

*Further differentiation:* second order and higher derivatives; logarithmic differentiation; differentiation of inverse trigonometric functions; differential coefficients of inverse hyperbolic functions

*Further integration:* integration by parts; integration by substitution; integration using partial fractions

*Applications of the calculus:* eg maxima and minima, points of inflexion, rates of change of temperature, distance and time, electrical capacitance, rms values, electrical circuit analysis, AC theory, electromagnetic fields, velocity and acceleration problems, complex stress and strain, engineering structures, simple harmonic motion, centroids, volumes of solids of revolution, second moments of area, moments of inertia, rules of Pappus, radius of gyration, thermodynamic work and heat energy

*Engineering problems:* eg stress and strain, torsion, motion, dynamic systems, oscillating systems, force systems, heat energy and thermodynamic systems, fluid flow, AC theory, electrical signals, information systems, transmission systems, electrical machines, electronics

#### **4 Be able to analyse and model engineering situations and solve problems using statistics and probability**

*Tabular and graphical form:* data collection methods; histograms; bar charts; line diagrams; cumulative frequency diagrams; scatter plots

*Central tendency and dispersion:* the concept of central tendency and variance measurement; mean; median; mode; standard deviation; variance and interquartile range; application to engineering production

*Regression, linear correlation:* determine linear correlation coefficients and regression lines and apply linear regression and product moment correlation to a variety of engineering situations

*Probability:* interpretation of probability; probabilistic models; empirical variability; events and sets; mutually exclusive events; independent events; conditional probability; sample space and probability; addition law; product law; Bayes' theorem

*Probability distributions:* discrete and continuous distributions, introduction to the binomial, Poisson and normal distributions; use of the normal distribution to estimate confidence intervals and use of these confidence intervals to estimate the reliability and quality of appropriate engineering components and systems

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Be able to analyse and model engineering situations and solve problems using algebraic methods	1.1 determine the quotient and remainder for algebraic fractions and reduce algebraic fractions to partial fractions 1.2 solve engineering problems that involve the use and solution of exponential, trigonometric and hyperbolic functions and equations 1.3 solve scientific problems that involve arithmetic and geometric series 1.4 use power series methods to determine estimates of engineering variables expressed in power series form
LO2 Be able to analyse and model engineering situations and solve problems using trigonometric methods	2.1 use trigonometric functions to solve engineering problems 2.2 use sinusoidal functions and radian measure to solve engineering problems 2.3 use trigonometric and hyperbolic identities to solve trigonometric equations and to simplify trigonometric expressions
LO3 Be able to analyse and model engineering situations and solve problems using calculus	3.1 differentiate algebraic and trigonometric functions using the product, quotient and function of function rules 3.2 determine higher order derivatives for algebraic, logarithmic, inverse trigonometric and inverse hyperbolic functions 3.3 integrate functions using the rules, by parts, by substitution and partial fractions 3.4 analyse engineering situations and solve engineering problems using calculus

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO4 Be able to analyse and model engineering situations and solve problems using statistics and probability	4.1 represent engineering data in tabular and graphical form 4.2 determine measures of central tendency and dispersion 4.3 apply linear regression and product moment correlation to a variety of engineering situations 4.4 use the normal distribution and confidence intervals for estimating reliability and quality of engineering components and systems.

## Guidance

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### Links

This unit can be linked with the core units and other principles and applications units within the programme. Entry requirements for this unit are at the discretion of the centre. However, it is strongly advised that learners should have completed the BTEC National unit *Mathematics for Engineering Technicians* or equivalent. Learners who have not attained this standard will require appropriate bridging studies.

### Essential requirements

There are no essential resources for this unit.

### Employer engagement and vocational contexts

The delivery of this unit will benefit from centres establishing strong links with employers willing to contribute to the delivery of teaching, work-based placements and/or detailed case study materials.

# Unit 16: Business Management Techniques for Engineers

Unit code:	R/601/1467
QCF level:	4
Credit value:	15
Guided Learning Hours:	60

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## Aim

This unit investigates the functions, structures and inter-relationships of an engineering business. Learners will apply the skills of costing, financial planning and control associated with engineered products or services.

## Unit abstract

In industry, engineers need to understand other factors which drive the business forward. The current financial state of the business will dictate what resources can be afforded to potential projects. Therefore, it is not always possible to select and use the latest technology. Most often, engineering solutions must also be business solutions which are constrained by budgets and time for example. To this end, engineering management requires understanding of business management techniques in order to advance business interests. This unit will provide the learner with the key knowledge and understanding of management skills required by engineering managers.

This unit is intended to give learners an appreciation of business organisations and the application of standard costing techniques, as well as an insight into the key functions underpinning financial planning and control. It also aims to expand learners' knowledge of managerial and supervisory techniques by introducing and applying the fundamental concepts of project planning and scheduling.

Learners will understand how to justify projects using financial tools such as profitability forecasts and contribution analysis. They will also be able to develop resource and project plans in the form of Gantt charts and with the use of software. They will be able to manage work activities using methods such as Just in Time (JIT) and Statistical Process Control (SPC).

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Know how to manage work activities to achieve organisational objectives
- 2 Be able to select and apply costing systems and techniques
- 3 Understand the key functions of financial planning and control
- 4 Be able to apply project planning and scheduling methods to an engineering project.

## Unit content

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### 1 Know how to manage work activities to achieve organisational objectives

*Engineering business functions:* organisational, management and operational structures in general engineering settings eg business planning, product/service development, design and production/delivery, quality assurance and control in relevant manufacturing, production, service or telecommunication industries

*Processes and functions:* business planning eg management, production/service planning, costing, financial planning; organisation eg mission, aims, objectives and culture

*Manage work activities:* product and service specifications and standards; quality, time and cost objectives eg just-in-time methods, value-added chains, statistical process control; working within organisational constraints and limitations

### 2 Be able to select and apply costing systems and techniques

*Costing systems:* systems eg job costing, process costing, contract costing; techniques eg absorption, marginal, activity-based

*Business performance:* measures and evaluation eg break-even point, safety margin, profitability forecast, contribution analysis, 'what if' analysis, limiting factors, scarce resources

### 3 Understand the key functions of financial planning and control

*Financial planning process:* short, medium and long-term plans; strategic plans; operational plans; financial objectives; organisational strategy

*Factors influencing decisions:* cash and working capital management eg credit control, pricing, cost reduction, expansion and contraction, company valuation, capital investment; budgetary planning eg fixed, flexible and zero-based systems, cost, allocation, revenue, capital, control, incremental budgeting

*Deviations:* variance calculations for sales and costs eg cash flow, causes of variance, budgetary slack, unrealistic target setting

### 4 Be able to apply project planning and scheduling methods to an engineering project

*Project resources and requirements:* human and physical resource planning techniques eg time and resource scheduling techniques, Gantt charts, critical-path analysis, computer software packages, work breakdown structure, precedence diagrams

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Know how to manage work activities to achieve organisational objectives	1.1 define engineering business functions 1.2 outline the inter-relationships between the different processes and functions of an engineering organisation 1.3 organise work activities to meet specifications and standards
LO2 Be able to select and apply costing systems and techniques	2.1 create appropriate costing systems and techniques for specific engineering business functions 2.2 measure the impact of changing activity levels on engineering business performance
LO3 Understand the key functions of financial planning and control	3.1 explain the financial planning process in an engineering business 3.2 examine the factors influencing the decision-making process during financial planning 3.3 analyse standard costing techniques
LO4 Be able to apply project planning and scheduling methods to an engineering project	4.1 establish the project resources and requirements 4.2 produce a plan with appropriate time-scales for completing the project 4.3 plan the human resource requirement and costs associated with each stage of the project.

## Guidance

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### Essential requirements

Learners will need access to manual records and relevant computer software packages to enable realistic project planning, resource allocation and costing assignments.

### Employer engagement and vocational contexts

In estimating costs and approximating project completion times and human resource needs, it may be necessary to provide information from a 'given data source'. However, learners should be encouraged to research their own data requirements, ideally from local industrial attachments, work-placement or employer.

# Unit 17: Mechanical Principles

Unit code:	F/601/1450
QCF level:	5
Credit value:	15
Guided Learning Hours:	60

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## Aim

This unit aims to develop learners' understanding of an extended range of mechanical principles that underpin the design and operation of mechanical engineering systems.

## Unit abstract

This unit will develop learners' understanding of complex loading systems and will provide an introduction to the concept of volumetric strain and the relationship between elastic constants. The expressions derived for linear and volumetric strain then form a basis for determining dimensional changes in loaded cylinders.

The unit will build upon learners' existing knowledge of the relationship between the distribution of shear force and bending moment in loaded beams, to include the relationship between bending moment, slope and deflection.

Learners will analyse the use of mechanical power transmission systems, both individually and in the combinations that are used in practical situations. Learners' knowledge of rotating system elements is further extended through an investigation of the dynamic characteristics of the slider-crank and four-bar linkage. The balancing of rotating systems is also investigated, together with the determination of flywheel mass and size to give sufficiently smooth operating conditions.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Be able to determine the behavioural characteristics of materials subjected to complex loading systems
- 2 Be able to determine the behavioural characteristics of loaded beams and cylinders
- 3 Be able to determine the dynamic parameters of power transmission system elements
- 4 Be able to determine the dynamic parameters of rotating systems.

## Unit content

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### 1 Be able to determine the behavioural characteristics of materials subjected to complex loading systems

*Relationship:* definition of Poisson's Ratio; typical values of Poisson's Ratio for common engineering materials

*Two- and three-dimensional loading:* expressions for strain in the x, y and z directions; calculation of changes in dimensions

*Volumetric strain:* expression for volumetric strain; calculation of volume change

*Elastic constants:* definition of Bulk Modulus; relationship between Modulus of Elasticity; Shear Modulus; Bulk Modulus and Poisson's Ratio for an elastic material

### 2 Be able to determine the behavioural characteristics of loaded beams and cylinders

*Relationships:* slope  $i = \frac{1}{EI} \int M dx$

deflection  $y = \frac{1}{EI} \iint M dx dx$

*Loaded beams:* slope and deflection for loaded beams eg cantilever beams carrying a concentrated load at the free end or a uniformly distributed load over the entire length, simply supported beams carrying a central concentrated load or a uniformly distributed load over the entire length

*Stresses in thin-walled pressure vessels:* circumferential hoop stress and longitudinal stress in cylindrical and spherical pressure vessels subjected to internal and external pressure eg compressed-air receivers, boiler steam drums, submarine hulls, condenser casings; factor of safety; joint efficiency

*Stresses in thick-walled cylinders:* circumferential hoop stress, longitudinal stress and radial stress in thick-walled cylinders subjected to pressure eg hydraulic cylinders, extrusion dies, gun barrels; Lamé's theory; use of boundary conditions and distribution of stress in the cylinder walls

### 3 Be able to determine the dynamic parameters of power transmission system elements

*Belt drives:* flat and v-section belts; limiting coefficient friction; limiting slack and tight side tensions; initial tension requirements; maximum power transmitted

*Friction clutches:* flat single and multi-plate clutches; conical clutches; coefficient of friction; spring force requirements; maximum power transmitted by constant wear and constant pressure theories; validity of theories

*Gear trains:* simple, compound and epicycle gear trains; velocity ratios; torque, speed and power relationships; efficiency; fixing torques

**4 Be able to determine the dynamic parameters of rotating systems**

*Plane mechanisms:* slider crank and four bar linkage mechanisms; production of vector diagrams and determination of kinetic characteristics

*Balancing:* single plane and multi-plane rotating mass systems; Dalby's method for determination of out-of-balance forces and couples and the required balancing masses

*Flywheels:* angular momentum; kinetic energy; coefficient of fluctuation of speed; coefficient of fluctuation of energy; calculation of flywheel mass/dimensions to give required operating conditions

*Effects of coupling:* conservation of angular momentum; common final velocity and energy loss due to coupling of two freely rotating systems

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Be able to determine the behavioural characteristics of materials subjected to complex loading systems	1.1 apply the relationship between longitudinal and transverse strain to determine the dimensional effects of uniaxial loading on a given material 1.2 determine the effects of two-dimensional and three-dimensional loading on the dimensions of a given material 1.3 determine volumetric strain and change in volume due to three-dimensional loading 1.4 apply the relationship between elastic constants
LO2 Be able to determine the behavioural characteristics of loaded beams and cylinders	2.1 apply the relationship between bending moment, slope and deflection to determine the variation of slope and deflection along a simply supported beam 2.2 determine the principal stresses that occur in a thin-walled cylindrical pressure vessel 2.3 determine the distribution of the stresses that occur in a pressurised thick-walled cylinder
LO3 Be able to determine the dynamic parameters of power transmission system elements	3.1 determine the dynamic parameters of a belt drive 3.2 determine the dynamic parameters of a friction clutch 3.3 determine the holding torque and power transmitted through compound and epicyclic gear trains
LO4 Be able to determine the dynamic parameters of rotating systems	4.1 determine the parameters of a slider-crank and a four-bar linkage mechanism 4.2 determine the balancing masses required to obtain dynamic equilibrium in a rotating system 4.3 determine the energy storage requirements of a flywheel 4.4 determine the dynamic effects of coupling two freely rotating systems.

## Guidance

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### Links

This unit can be linked with *Unit 15: Analytical Methods for Engineers*.

### Essential requirements

Sufficient laboratory/test equipment will need to be available to support a range of practical investigations.

### Employer engagement and vocational contexts

Liaison with employers would prove of benefit to centres, especially if they are able to offer help with the provision of suitable mechanical systems/equipment that can be used to demonstrate applications of the principles.



# Unit 18: Engineering Design

Unit code:	M/601/1475
QCF level:	5
Credit value:	15
Guided Learning Hours:	60

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## Aim

This unit will enable learners to prepare an engineering design specification that meets customer requirements and produce a final design report.

## Unit abstract

This unit will enable the learner to appreciate that design involves synthesising parameters that will affect the design solution. The learner will prepare a design specification against a customer's specific requirements. They will then prepare a design report that provides an analysis of possible design solutions, an evaluation of costs and an indication of how the proposed design meets the customer's specification. It is expected that the learner will, during the design processes, make full use of appropriate information and communication technology (ICT).

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Be able to prepare a design specification to meet customer requirements
- 2 Be able to analyse and evaluate possible design solutions and prepare a final design report
- 3 Understand how computer-based technology is used in the engineering design process.

## Unit content

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### 1 Be able to prepare a design specification to meet customer requirements

*Customer requirements:* all relevant details of customer requirements are identified and listed, e.g. aesthetics, functions, performance, sustainability, cost, timing and production parameters; all relevant regulations, standards and guidelines are identified and listed, e.g. international, national, company policy and procedures, industry specific, statutory bodies

*Design parameters:* implications of specification parameters and resource requirements are identified and matched; the level of risk associated with each significant parameter is established

*Design information:* all relevant information is extracted from appropriate reference sources; techniques and technologies used in similar products or processes are identified; use of new technologies are specified where appropriate; relevant standards and legislation are identified and applied throughout; design specification is checked against customer requirements

### 2 Be able to analyse and evaluate possible design solutions and prepare a final design report

*Analysis of possible design solutions:* selection and use of appropriate analysis techniques to achieve a design solution, e.g. matrix analysis, brainstorming, mind mapping, forced decision making, simulation

*Evaluation of conceptual designs:* costs; future development potential; value engineering concepts

*Compliance check:* e.g. using checklists and/or design review procedures

*Final design report:* communicate rationale for adopting proposed solution; use of appropriate techniques and media in the presentation of the report eg sketches, charts, graphs, drawings, spreadsheets/databases, computer aided design (CAD), desk top publishing (DTP), word-processing

### 3 Understand how computer-based technology is used in the engineering design process

*Key features of computer-aided design systems:* 2D design and 3D modelling systems e.g. accessing standards, parts and material storage and retrieval, engineering calculations, PCB layouts, integrated circuit design, circuit and logic simulation (including ac, dc and transient analysis, schematic capture)

*CAD software:* accessing and using appropriate design software eg parts assembly, pipe-work and ducting layouts, networks, planned maintenance, scheduling, planning, stress and strain, heat transfer, vibration analysis, resource utilisation, plant layout, costing, circuit emulation, plant electrical services, for example, finite element analysis and printed-circuit board analysis software

*Software evaluation:* consideration of costs, compatibility and function

## Learning outcomes and assessment criteria

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<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Be able to prepare a design specification to meet customer requirements	1.1 establish customer requirements 1.2 present the major design parameters 1.3 obtain design information from appropriate sources and prepare a design specification 1.4 demonstrate that the design specification meets requirements
LO2 Be able to analyse and evaluate possible design solutions and prepare a final design report	2.1 produce an analysis of possible design solutions 2.2 produce and evaluate conceptual designs 2.3 select the optimum design solution 2.4 carry out a compliance check 2.5 produce a final design report
LO3 Understand how computer-based technology is used in the engineering design process	3.1 explain the key features of a computer-aided design system 3.2 use computer-aided design software to produce a design drawing or scheme 3.3 evaluate software that can assist the design process.

## Guidance

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### Links

The unit has links to the SEMTA Level 4 National Occupational Standards in Engineering Management, particularly *Unit 4.12: Create Engineering Designs* and *Unit 4.13: Evaluate Engineering Designs*.

### Essential requirements

Access to suitable software packages will need to be available. These could include packages for computer-aided design, assembly procedures, critical path, plant layout, planned maintenance, utilisation, material selection, standard component and matrix analysis.

### Employer engagement and vocational contexts

Delivery of this unit would benefit from visits to an engineering design facility or the attendance of guest speaker(s) with experience of engineering design in a relevant industrial environment.

# Unit 19: Manufacturing Planning and Scheduling Principles

Unit code:	A/601/1480
QCF level:	5
Credit value:	15
Guided Learning Hours:	60

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## Aim

This unit will develop learners' understanding of the methodologies and techniques that are used in process planning and scheduling and will enable them to plan and schedule a manufacturing activity.

## Unit abstract

Learners will develop an understanding of how manufactured products and their associated processes are planned, monitored and controlled and extend their knowledge of and ability to apply both manual and computer-assisted methods and procedures. The unit covers process plans (for example forecasting, network analysis, etc), capacity assessment and scheduling. This leads the learner into inventory management with stock control and documentation systems. The last two outcomes require the learner to examine group technology, process plans and production scheduling.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the use of process planning, capacity assessment and scheduling techniques
- 2 Understand inventory management including stock control, shop floor documentation systems and the functions of shop control
- 3 Understand the methods of classifying and coding component parts as key elements of group technology and their processing through grouped facilities
- 4 Be able to plan and schedule a manufacturing activity.

## Unit content

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### 1 Understand the use of process planning, capacity assessment and scheduling techniques

*Process planning:* forecasting; network analysis; critical path method (CPM); project evaluation and review technique (PERT); material requirement planning (MRP); equipment and tooling; make or buy decisions; computer aided-planning and estimating

*Capacity assessment:* bill of materials; economic batch size; assessment of load and capacity; effects of re-working and scrap; methods of increasing/decreasing capacity; time-phased capacity planning

*Scheduling:* lead times; critical path analysis (CPA); supplier and production schedules; Kanban; optimised production technology (OPT) philosophy; influence of scheduling on capacity planning dispatching; material requirement planning (MRP)

### 2 Understand inventory management including stock control, shop floor documentation systems and the functions of shop control

*Inventory management:* types of inventory; dependent and independent demand; role of buffer stock; cost of inventory

*Stock control systems:* periodic review; re-order points; two bin system; basic economic order quantities; Kanban

*Documentation systems:* works orders; routing document; job tickets; recording of finished quantities; re-work and scrap; stock records

*Shop control:* scheduled release of works orders; progressing; data collection and feedback

### 3 Understand the methods of classifying and coding component parts as key elements of group technology and their processing through grouped facilities

*Classifying and coding:* sequential; product; production; design; Opitz method; classification of parts into families

*Grouped facilities:* layout; product; process; fixed position; group; sequencing of families for groups of facilities

### 4 Be able to plan and schedule a manufacturing activity

*Process plan:* forecast to identify timings and completion dates; materials required; equipment and tooling required; methods or processes employed; labour requirements and planning for quality checks; proposal for data logging; use of computers; MRP

*Production schedule:* developed from the process planning and customer requirements; lead times; using scheduling techniques, e.g. CPA, Gantt charts, software packages, OPT philosophy, MRP

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand the use of process planning, capacity assessment and scheduling techniques	1.1 evaluate the use of three different process planning techniques 1.2 select and assess the use of a capacity assessment technique for two different types of manufacturing process 1.3 explain the use of a range of scheduling techniques
LO2 Understand inventory management including stock control, shop floor documentation systems and the functions of shop control	2.1 explain an application of the principle of inventory management 2.2 compare and evaluate two different stock control systems 2.3 discuss two different shop floor documentation systems 2.4 explain the functions of shop control
LO3 Understand the methods of classifying and coding component parts as key elements of group technology and their processing through grouped facilities	3.1 explain the methods of classifying and coding component parts into family groups 3.2 explain how family groups of components are sequenced for processing through grouped facilities
LO4 Be able to plan and schedule a manufacturing activity	4.1 produce a process plan from a given set of data 4.2 produce a production schedule from a process plan.

## Guidance

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### Links

This unit can be linked with *Unit 18: Engineering Design*.

The unit also has links to the SEMTA Level 4 National Occupational Standards in Engineering Management, particularly Unit 4.16: Schedule Activities for Engineering Methods and Procedures.

### Essential requirements

Both manual records and relevant computer software of industrial standards will need to be available to enable realistic project and assignment work to be undertaken.

### Employer engagement and vocational contexts

Liaison with industry should be encouraged in order to develop a valuable and relevant resource facility. Where possible, work-based experience should be used to provide practical examples of the planning and scheduling principles covered.

# Unit 20: Contextual and Cultural Referencing in Art and Design

Unit code:	D/601/6378
QCF level:	4
Credit value:	15
Guided Learning Hours:	60

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## Aim

The aim of this unit is to encourage an understanding of the social, psychological, cultural, historical and commercial factors which underpin all visual arts theory and practice across the spectrum of subject specialisms.

## Unit abstract

This unit develops learners' knowledge of the cultural history and social theory which informs current thought and debate across the visual arts. Emphasis is on research and study skills and on learners acquiring source material and knowledge.

For this unit learners will need to be familiar with a broad sweep of the historical and cultural developments which inform current thought and debate about art and design in general and their chosen specialism in particular.

Also presentation skills will be applied in a practical context. Notebooks and visual diaries should indicate that learners understand and develop information received from lectures and seminars. Oral presentations and illustrated assignments should form part of learners' practical work and can be linked to practical units.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Be able to undertake in-depth research
- 2 Understand influences on art and design activities and outcomes through the interpretation and analysis of information
- 3 Be able to assess, interpret and evaluate information
- 4 Be able to evaluate and present conclusions.

## Unit content

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### 1 Be able to undertake in-depth research

*Digital sources:* e.g. retrieval of computer-based data, internet, CD ROM, films, videos

*Paper-based materials:* e.g. use of libraries, learning resources centre, notes from lectures and group presentations, printed ephemera

*Other sources:* e.g. local and distant visits to collections, museums, original sources and personal life experiences

### 2 Understand the influences on art and design activities and outcomes through the interpretation and analysis of information

*Historical and cultural histories:* e.g. major historical movements, modern practitioners, relationship between modern practice and historical sources, current attitudes towards the arts, current cultural context, historical concepts and principles versus modern notions of moral and ethical practice, relevant sources from other academic disciplines

*Making judgements:* questioning; comparing; measuring; observing; rationalising

### 3 Be able to assess, interpret and evaluate information

*Sources:* personal research; primary; secondary

*Synthesis:* ideas; influences; observation; personal view

### 4 Be able to evaluate and present conclusions

*Presentation forms:* e.g. oral presentation, visual presentation, illustrated written study

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Be able to undertake in-depth research	1.1 Research a variety of areas of study using sources effectively 1.2 Research a variety of external sources effectively
LO2 Understand the influences on art and design activities and outcomes through the interpretation and analysis of information	2.1 Understand the interrelationship between the various strands of art and design activities within their historical development 2.2 Demonstrate the relationship between historical development and modern practice and principles 2.3 Show a questioning, rationalising approach to personal observations and evaluations of subject matter within a specialist area
LO3 Be able to assess, interpret and evaluate information	3.1 Effectively research, evaluate and interpret secondary source material in a variety of media and applications 3.2 Effectively research, evaluate and assess personal and primary information from a variety of sources 3.3 Synthesise information from observations and personal or others' ideas
LO4 Be able to evaluate and present conclusions	4.1 Produce written illustrated studies to formal academic conventions 4.2 Produce informal visual diaries throughout the programme which are used also for reference in other units 4.3 Give live oral or digitally recorded presentations.

## Guidance

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### Links to other BTEC units

This unit has links with *Unit 22: Critical Study in Art and Design*.

### Essential requirements

Specialist staffing, resources and materials relevant to art and design.

### Employer engagement and vocational contexts

This unit can be combined with a live brief set by a client relevant to the pathway, to encourage learners to generate ideas with a client or purpose in mind.

# Unit 21: Professional Practical in Art and Design

Unit code:	D/601/6381
QCF level:	5
Credit value:	15
Guided Learning Hours:	60

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## Aim

The aim of this unit is to extend learners' knowledge of professional practices within their specialist area and to relate these to personal goals and career opportunities.

## Unit abstract

This unit serves to evaluate and assimilate learners' skills to provide a coherent, creative and professional portfolio of work which can be used for subsequent interviews and presentations. Portfolios will be focused on individual career paths and should be in the most appropriate format, eg paper based, CD, website, blog, vlog, integrated media.

Learners will also prepare for their future, through participation in self-analysis and reflection, recognition of strengths and weaknesses, goal setting, practising interview techniques and making applications for jobs. Learners will be expected to research their intended career path and specific job role in order to be well informed of the strategies and knowledge needed to conduct successful interviews. Opportunities will be given to the development of a business database and the opportunity to formulate a long-term career plan or further study proposal. This will be supported by the creation and production of a self-promotional package, including an updated CV, business cards, web page and other appropriate promotional tools.

This unit will allow learners the time to reflect on the previous years of study and to assess their strengths and weaknesses. It will allow evaluation of their own progression, the contribution they have made to their subject and the broader critical debate surrounding their subject.

Learners will work in groups to help each other understand their strengths and weaknesses. Tutorials will be conducted throughout the unit with a formal in-house job interview and presentation critique at the end of the unit. The unit should be further enhanced by input from visiting practitioners from a selection of areas within the specialist subject. Learners should be encouraged to contact potential employers for interviews, work shadowing or work placement.

## **Learning outcomes**

### **On successful completion of this unit a learner will:**

- 1 Be able to place themselves and their work in the context of their selected discipline
- 2 Understand their specialist area and the career opportunities available
- 3 Be able to develop and present a professional portfolio in an appropriate format
- 4 Understand how to promote themselves and their work professionally.

## Unit content

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### 1 Be able to place themselves and their work in the context of their selected discipline

*Goal setting:* e.g. through SWOT analysis, Belbin questionnaire, self-reflection, brain storming, decision trees, aspirations, needs, wants, transferable skills, action plans, business plan

*Career direction:* e.g. educational; employment; work experience; business start-up; freelance, part time, apprenticeship; new directions; gap year

*Aspirations:* e.g. creative, managerial, team working; autonomy, personal ethics e.g. causes; environmental, ecological, charitable, educational; short term, long term

*Responsibilities:* to agents; sponsors; clients; employers e.g. meeting deadlines, respecting confidentiality, settling bills; to consumers e.g. protection of consumers, supply of quality work; to self, e.g. conscience, costing, salary, ethics, legal issues

### 2 Understand their specialist area and the career opportunities available

*Research:* through marketing information; interviews; collecting and collating data; past experiences; industry contacts

*Considerations:* qualities required, e.g. visual competence, communication skills, confidence, team working skills, experience, empathy, resilience, hard work, negotiation skills; practical, e.g. money, cost of living, distance to travel, family commitments, working conditions, potential colleagues, promotional prospects

*Practicalities:* e.g. personal and public liability, insurance, taxes, freelance, self employment, fees structures, negotiating, using agencies, copyright, intellectual property, contracts, working conditions

### 3 Be able to develop and present a professional portfolio in an appropriate format

*Portfolio:* format, e.g. paper-based, CD, video, interactive media; supporting information e.g. focus, intentions, developmental, finished, research, evaluation

*Organised:* e.g. structured, clarity, cohesive, creative, chronological, descriptive

*Supporting information:* e.g. CV, business card, headed paper, personal statement, job application, references, named referees, work experiences endorsements

### 4 Understand how to promote themselves and their work professionally

*Personal qualities:* e.g. attitude, dress, manner, speaking, listening; strategic eg adjusting to situation, trouble shooting, varying circumstances

*Presentation skills:* e.g. formal, informal, oral, visual, finished, work in progress, interview techniques

*Personal development:* e.g. confidence, diplomacy, verbal communication, positive attitude

*Promotional opportunities:* e.g. exhibitions, trade fairs, competitions, displays, shows; events, e.g. receptions/private views, film premieres, celebrity endorsement, trade publications; internet, e.g. social networks, blogs; use of media, e.g. editorial, interviews; personal promotion, e.g. business cards; CV, personal statement, postcards, flyers

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Be able to place themselves and their work in the context of their selected discipline	1.1 Present a critical justification of own work in the context of the selected discipline 1.2 Debate and justify choices and conclusions relating to proposed career directions 1.3 Produce an outline career plan based upon targeted research and critical self-evaluation
LO2 Understand their specialist area and the career opportunities available	2.1 Demonstrate in-depth knowledge of the industry related to their specialist area through a personal database 2.2 Identify key roles within the selected industry and the personal qualities required for success 2.3 Identify and map own qualities and skills relating to career opportunities
LO3 Be able to develop and present a professional portfolio in an appropriate format	3.1 Present and support a portfolio of work that supports the proposed career direction 3.2 Integrate supporting information into portfolio work in order to enhance and justify career direction 3.3 Adapt and apply contemporary practices and technologies to enhance personal promotion
LO4 Understand how to promote themselves and their work professionally	4.1 Analyse and develop a range of opportunities and strategies for self-promotion 4.2 Produce a creative self-promotional campaign which includes written and visual marketing strategies 4.3 Conduct themselves at interview in an appropriate, personable and professional manner.

## Guidance

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### Essential requirements

Space, facilities and equipment should be provided for learners to make professional presentations of their work at the final critique.

### Employer engagement and vocational contexts

Learners should be encouraged to collaborate with their selected industry, either through work shadowing, interviews or a period of work placement. The following organisations may also be helpful.

- Creative and Cultural Skills ([www.ccskills.org.uk](http://www.ccskills.org.uk)), the sector skills council for design, crafts and visual arts, has launched the web portal Creative Choices ([www.creative-choices.co.uk](http://www.creative-choices.co.uk)). This portal has a range of information about careers in the design sector, including job descriptions.
- Skillset ([www.skillset.org](http://www.skillset.org)) is the sector skills council for careers in interactive media, photography, fashion and textiles.
- The Prospects Work Bank ([www.prospects.ac.uk](http://www.prospects.ac.uk)) available through the graduate careers website is an online database of companies offering work experience.
- The National Council for Work Experience ([www.ncwe.com](http://www.ncwe.com)) can assist with placements and produces a free guide 'Focus on Work Experience'.

# Unit 22: Critical Study in Art and Design

Unit code:	L/601/5419
QCF level:	5
Credit value:	15
Guided Learning Hours:	60

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## Aim

The aim of this unit is to extend knowledge and understanding of the research, analysis and application of historical and contextual skills to a selected field of study.

## Unit abstract

This unit gives learners an opportunity to investigate selected references within the context of their own work, through encouraging independent selection and analysis of historical, contextual and contemporary sources. Learners will be encouraged to investigate factors which determine cultural and creative influences in art and design. These will not only include the influences of artists and designers, but also the social, aesthetic, technological, ecological and economic global forces which can shape modern thinking and direction.

The unit will investigate textual analysis and historical understanding in the context of contemporary art and design practice. Learners will be encouraged to use this analysis to develop an understanding of themselves and their work within their selected areas of interest. Debate and discussion will form an important part of this unit, with learners working in small study groups as well as independently.

Learners will be expected to show a high level of personal initiative and an inquisitive mind to meet the unit outcomes. Study should complement learners' chosen vocational routes and lead to self-awareness from a historical, contemporary and commercial perspective. Formal delivery should concentrate on research and presentation skills followed by systematic seminars and tutorial sessions on a group or individual basis.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the historical evolution and visual characteristics of the work of artists and designers
- 2 Understand and apply appropriate methods of research and analysis
- 3 Be able to apply the influences of historical, contemporary and contextual factors to own practice
- 4 Be able to synthesise research and present a professional and personal written study.

## Unit content

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### 1 Understand the historical evolution and visual characteristics of the work of artists and designers

*Definitions:* key movements, e.g. Bauhaus, Constructivism, Realism, Impressionism, Modernism, Post-Modernism, Symbolism, Arts and Crafts, Surrealism, Art Deco, Art Nouveau, Pop Art

*Chronology:* timelines, e.g. key movements, styles, influences, world events

*Comparisons:* relevant to pathway, e.g. key artists, designers, craftspeople, styles, movements

*Visual and textual sources:* e.g. paintings, architecture, landscapes, nature, historical references, ancient traditions, visual language, ornament, decoration, events, world travel, scientific discoveries, poems, stories, narratives, locations, achievements

*Techniques, processes and interpretation:* relevant to pathway, e.g. in own work, selection, compilation, visual language, application, evaluation, reflection, reworking

### 2 Understand and apply appropriate methods of research and analysis

*Research:* sources, e.g. library, reference systems, abstracting, electronic, museums, galleries, study centres, exhibitions, workshops, interviews, questionnaires

*Methods:* research, e.g. field research, desk research, primary sources, secondary sources

*Extracting information:* relevant to pathway, e.g. practising professionals, visual language, techniques, creative contexts, cultural sources, ethnic, world art, cinema, graphics, advertising, textiles, national dress, music

### 3 Be able to apply the influences of historical, contemporary and contextual factors to own practice

*Influences:* economic; political; social, e.g. urban migration; environmental; technological, e.g. developing digital applications, installation, video, popular culture; philosophical, e.g. ethics, aesthetics, values, choices, justice, free will, feminism, freedom, determinism, causality, manipulation

*Styles:* current practice, e.g. European, Asian, African, international; ethnicity, e.g. English folk traditions, Celtic; historical practice

*Interrelationships:* e.g. art, craft, design, literature, music, photography, graphics, ceramics, fashion, film, artists, art movements

### 4 Be able to synthesise research and present a professional and personal written study

*Drawing conclusions:* e.g. comparative study, personal debate, critical analysis, interpretations, quotations, conclusion, evaluation, creating argument

*Personal view:* e.g. opinions, arguments, defending ideals, verification of argument, originality of viewpoint

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand the historical evolution and visual characteristics of the work of artists and designers	1.1 Analyse textual and visual sources and apply these in the context of own work 1.2 Recognise and record influential factors and their impact on creative and aesthetic evolution
LO2 Understand and apply appropriate methods of research and analysis	2.1 Identify and apply effective methods of research and information retrieval from a range of sources 2.2 Assimilate and apply a personal, reflective record of contemporary criticism and references from primary and secondary source materials
LO3 Be able to apply the influences of historical, contemporary and contextual factors to own practice	3.1 Evaluate the creative, cultural, political, economic and social contexts which impact on own practice 3.2 Apply influences to inform own thinking and practice
LO4 Be able to synthesise research and present a professional and personal written study	4.1 Synthesise a body of personal research into cohesive and written conclusions, presenting insight and understanding of contextual influences 4.2 Present a body of written work to a professional standard and critically evaluate and review conclusions relating to own practice.

## Guidance

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### Links to other BTEC units

This unit has links with the following unit *Unit 20: Contextual and Cultural Referencing in Art and Design*

### Essential requirements

Work should be presented as an extended written study of 3,500 words which should integrate all historical and contextual referencing. An appendix citing evidence of study skills and research methods should accompany the work to provide evidence for learning outcome 2.

Learners will be expected to present their work professionally and should therefore have access to associated print and page layout software. Learners will need access to primary sources such as local and national galleries, exhibitions, artists/designers' studios and workshops.

### Employer engagement and vocational contexts

As this unit is essentially an academic exercise, there will be minimum employer engagement although learners will be encouraged to visit practising artists and designers for interview and information purposes. Discussions with artists about the way their work is presented from a critical standpoint is an important factor for this unit. In a vocational context, the ability to present and defend a personal viewpoint is an invaluable skill which will be used throughout professional life.

## Unit 23: Professional Studies in Art and Design

Unit code:	F/601/5417
QCF level:	5
Credit value:	15
Guided Learning Hours:	60

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### Aim

This unit aims to develop learners' understanding of professional practice through research, analysis and implementation of factors that influence art and design professionals including ethics, social and environmental responsibility.

### Unit abstract

The focus of this unit is on enabling learners to put practical studies in art and design in a professional context. Learners should explore legislation affecting designers and develop their understanding of professional ethics and responsibilities.

The unit requires learners to examine business organisations and to compare job roles of artists, designers and craftspeople working in different kinds of organisations. This can be done through case studies, studio visits, seminars, independent research and by interviewing professionals in the chosen aspect of research. Learners are expected to investigate the ethics and responsibilities of artists, designers and craftspeople in relation to society and the environment.

To ensure theory is put into practice, parts of this unit can be delivered alongside units that define each learner's discipline, by means of cross-unit assignments or as a stand-alone research project.

Most of the evidence for this unit could be presented as a file of notes, collated printed material, summarised case studies and personal commentary written by the learner. Audio or visual material could also be submitted, giving learners flexibility as to how they present their findings.

### Learning outcomes

#### On successful completion of this unit a learner will:

- 1 Understand the types of legislation affecting designers
- 2 Understand the need for professional ethics and responsibility in design
- 3 Understand environmental and social responsibility in design
- 4 Understand the relationships between business organisations and job roles of designers.

## Unit content

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### 1 Understand the types of legislation affecting designers

*Legislation:* copyright law; intellectual property; consumer protection; equal opportunities; Disability Discrimination Act

*Regulations:* Health and Safety, e.g. Control of Substances Hazardous to Health regulations (COSHH), electricity at work regulations (portable appliance testing), working with VDUs (display screen equipment) regulations, Health and Safety at Work Act (1974)

*Insurances:* protection, e.g. product liability, professional indemnity, public liability, employers liability

### 2 Understand the need for professional ethics and responsibility in design

*Codes of ethics:* personal, e.g. punctuality, honesty, integrity, conscientiousness, respect for others; corporate, e.g. professional bodies' codes of practice, company policies and charters, regulation, quality assurance

*Professional responsibilities of designers:* professional working relationships, e.g. agents, sponsors, clients, employers, employees, contractors; reliability, e.g. meeting deadlines, confidentiality, payment, completing work to the required brief; safety of consumers and the general public, e.g. protection of consumers, avoidance of the public display or sale of discriminatory or offensive products, images or messages, not to promote or advertise products or events which may cause distress, harm or incite criminal acts

### 3 Understand environmental and social responsibility in design

*The environment:* sustainability, e.g. 'green' issues, recycling, use of natural resources, renewable sources; disposal of waste products, e.g. during manufacture, life-cycle of products and packaging

*The consumer society:* visual meaning, e.g. use of style, image, durability, efficiency of products, culture, lifestyle, globalisation, upward mobility, aspiration

*The secular society:* social, e.g. politics, economics, science, technology, socio-economic groups

*Moral issues:* respecting individuals, e.g. religion, ethnic groups, poverty, gender, sexuality, spirituality

### 4 Understand the relationships between business organisations and job roles of designers

*Businesses and organisations in which designers work:* types, e.g. sole trader, Limited Company, Partnership, Limited Liability Partnership, Limited Liability Company, not-for-profit, charity, trust, social enterprise, agency, in-house, consultancy; purpose, e.g. advertising, media, public relations (PR), communications, press, packaging, design, product design, web design, marketing; structures of organisations

*Business practice:* employment, e.g. freelance, short term contract, fixed term contract, permanent contract, contractor, hot desk, agency, consultant

*Job roles:* types of roles, e.g. runner, junior, Mac Operator, page layout, proof reader, designer, editor, senior designer, art director, picture editor studio manager, design manager, creative director

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand the types of legislation affecting designers	1.1 Research and follow legislation affecting designers 1.2 Demonstrate a clear understanding of the effects of legislation on the work of designers
LO2 Understand the need for professional ethics and responsibility in design	2.1 Investigate codes of ethics developed by companies and professional bodies 2.2 Prioritise a personal code of ethics 2.3 Evaluate the need for professional responsibility in design
LO3 Understand environmental and social responsibility in design	3.1 Evaluate environmental responsibility in design 3.2 Evaluate the social responsibilities of designers
LO4 Understand the relationships between business organisations and job roles of designers	4.1 Research and evaluate the types and purposes of businesses and organisations in which designers work 4.2 Research and evaluate the structures of different types of businesses and organisations in which designers work.

## Guidance

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### Links to other BTEC units

This unit has links with the following unit:

- Unit 21: Professional Practice in Art and Design

### Essential requirements

This unit is a research and theory unit and so learners will need access to industry reports and practitioners in relevant pathways. Delivery should be a combination of seminar, lecture, case study, interview and independent research.

### Employer engagement and vocational contexts

Learners should develop employer engagement through direct contact, eg seminars, lectures, guest speakers, workshops where they can ask questions and find out information or indirect, eg interviews, questionnaires, case study, reviews of business literature.

# Unit 24: Understanding the Learning process

Unit code:	F/601/1657
QCF level:	5
Credit value:	15
Guided Learning Hours:	60

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## Aim

The aim of this unit is to enable learners to develop understanding of different theories and styles of learning and to apply this to learning strategies within the health and social care workplace.

## Unit abstract

The unit investigates the learning process. Learners will explore current theories of learning and relate these to the development of practical skills and the acquisition of knowledge and understanding. The unit provides an understanding of the different ways in which individuals learn and can be supported in the health and social care workplace to develop practice. Learners will draw on their own experience to suggest ways of supporting learning. Learners will investigate individual learning needs and consider how practice in the health and social care workplace can provide support for care workers. They will explore ways of planning learning opportunities and the factors that contribute to successful delivery of learning in the workplace.

This unit is particularly appropriate for those with responsibilities for supporting the learning of others in the workplace, but would be equally useful for practitioners to use as part of their own personal and professional development.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand different theories of learning
- 2 Understand the impact of learning styles on learning by individuals
- 3 Be able to suggest strategies for delivering and assessing learning in a health and social care workplace
- 4 Understand how to support the individual learning needs of health and social care workers.

## Unit content

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### 1 Understand different theories of learning

*Domains of learning:* Bloom's Taxonomy of learning domains (cognitive, psychomotor, affective)

*Theories of learning:* behaviourist, gestalt, cognitive, humanistic

*Different ways in which learning can occur:* learning cycle (Kolb), learning circles (Race); learning through doing, learning through experience; planning, teaching, observing, mentoring, tutoring, demonstration, feedback

### 2 Understand the impact of learning styles on learning by individuals

*Learning style:* visual, aural, tactile, kinaesthetic; activist, reflector, pragmatist, theorist

*Influences:* motivation, environment, culture, communication, past experience

*Own learning:* motivation, responsibilities, experiential, learning from others, learning by doing

### 3 Be able to suggest strategies for delivering and assessing learning in a health and social care workplace

*Factors to be considered:* benefits, e.g. for the user of services, team, organisation, individual; quality systems; learning outcomes required; resources available; scheduling; occupational standards; learning styles

*Teaching strategies:* work-based, through experience; learning in groups, individual learning, classroom-based teaching, mentoring, tutoring, shadowing, demonstration, coaching, online, question and answer, independent learning; one-to-one, groups

*Strategies for delivering learning:* planning, induction, resources and materials, guidance, personal support, monitoring and review, feedback, Individual Learning Plans, formative assessment, summative assessment

*Techniques for assessing learning:* testing, e.g. question and answer; observation, e.g. direct, expert witness records; evidence-based, e.g. projects, presentations, artefacts produced; against National Occupational Standards

### 4 Understand how to support the individual learning needs of health and social care workers

*Learning needs:* literacy, numeracy, IT, second language, sensory impairment, dyslexia, dyspraxia, attention deficit, time-management

*Diagnostic tools:* for literacy, numeracy; oral, paper-based, online

*Support for individual learning needs:* teaching strategies, technical aids, learning materials, planning learning, teaching, assessing, providing feedback, supporting quality assurance

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand different theories of learning	1.1 explain how different domains of learning apply to learning in health and social care 1.2 explain different ways in which learning can occur in health and social care workplaces 1.3 analyse how theories of learning relate to the development of understanding and skills in health and social care
LO2 Understand the impact of learning styles on learning by individuals	2.1 explain different factors that can influence the effectiveness of learning 2.2 explain concepts of learning style 2.3 assess own preferred learning style 2.4 analyse influences on own learning in relation to learning theory
LO3 Be able to suggest strategies for delivering and assessing learning in a health and social care workplace	3.1 describe factors to be considered when planning a workplace learning programme 3.2 present relevant teaching strategies to support the learning of others for a health and social care workplace 3.3 suggest a strategy for delivering and assessing learning in a health and social care workplace
LO4 Understand how to support the individual learning needs of health and social care workers.	4.1 explain barriers to learning that maybe encountered by individuals in the health and social care workplace 4.2 describe methods of identifying individual learning needs 4.3 evaluate different approaches that could be adopted to support the individual learning needs of health and social care workers.

## Guidance

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### Essential requirements

It is essential that this unit is delivered by a tutor who can introduce learners to learning and assessment processes, as are required for completion of the unit.

### Employer engagement and vocational contexts

Relevant information on lifelong and work-based learning can be found at the following:

[www.ento.org.uk](http://www.ento.org.uk)

Work-based learning National Training Organisation

[www.lluk.org](http://www.lluk.org)

Lifelong Learning UK

[www.niace.org.uk](http://www.niace.org.uk)

National Institute of Adult Continuing Education

# Unit 25: Psychology of Human and Criminal Behaviour

Unit code:	T/502/9479
QCF level:	4
Credit value:	15
Guided Learning Hours:	60

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## Aim

The aim of this unit is to enable learners to gain an understanding of psychological theories in relation to criminal behaviour.

## Unit abstract

Learners will examine psychological approaches and theories and relate them to criminal behaviour. The unit covers how people behave and inter-relate with each other and with organisations. Learners will explore how individuals learn and communicate.

This unit gives learners the opportunity for learners to explore the causes and consequences of prejudice and discrimination and to look at the different types of prejudice and discrimination and their impact on victims and organisations.

The unit requires the learner to explore theories of criminal behaviour and causes of crime. Emphasis is placed on the psychological theories that attempt to explain criminal behaviour so that learners develop a greater understanding of what makes people behave in such ways and how criminal behaviour impacts on victims.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand different approaches to psychology
- 2 Understand how psychology can be used to benefit the individual and the organisation
- 3 Understand the causes and consequences of prejudice and discrimination
- 4 Understand the major theories of criminal behaviour and causal factors.

## Unit content

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### 1 Understand different approaches to psychology

*Approaches:* cognitive; humanistic; behaviourist including observational learning, modelling

*Psychology:* theoretic study of human thought, emotion, mind and behaviour; applied psychology including self-help, improving mental health, performance enhancement

*Personality theories:* biological theory, e.g. Eysenck; behavioural theory, e.g. Skinner; psychodynamic, e.g. Freud; humanist, e.g. Maslow and Rogers

### 2 Understand how psychology can be used to benefit the individual and the organisation

*Individual:* communication including using submissive, assertive, aggressive, techniques; learning including using behaviourism, learning theory, learning styles, e.g. Kolb, Honey and Mumford, Fleming; using social learning theory, e.g. Piaget, Bandura, Julian

*Organisation:* group psychodynamics including psychodynamic theories of group tensions, studies of in groups and out groups, e.g. Guzzo; work on group performance, e.g. Tavistock Institute

*Conflict management:* need for self-knowledge; levels of conflict; systematic approaches to managing conflict; conflict management models including Thomas and Kilmann, Handy; origins of attitude; benefits and costs of conflict management

### 3 Understand the causes and consequences of prejudice and discrimination

*Prejudice:* definition; types and forms of prejudice; situations where prejudice can occur; reasons for prejudice; causal factors; individual control of own behaviour and that of others; effects and impact of prejudice on the victim and the organisation

*Discrimination:* definition; types; reasons for discrimination; causal factors; individual control of own behaviour and that of others; manifestation; perpetual behaviour; effects and impact of discrimination on the victim and the organisation

*Self-reflection:* values, beliefs and judgements; influence of family, peer groups, media and tradition; cause and effect of stereotyping

*Theories and models:* G W Allport; Stephan and Stephan; Devine, Plant and Buswell; showing escalation of behaviour as response to discrimination; responses to dominance (acquiesce, resist, withdraw); coping strategies

### 4 Understand the major theories of criminal behaviour and causal factors

*Theories:* psychological theories of crime, e.g. Bowlby and maternal deprivation, social learning theory, rational choice theory, cognitive theory, Eysenck's biosocial theory; validity of theories in explaining criminal behaviour

*Research information:* including British Crime Survey, Macpherson Report, Macpherson Report – Ten Years On

*Perpetrators:* forms of criminal proceedings; public services available to offenders including offender programmes, rehabilitation, support in relation to offender ethnicity

*Causal factors:* genetic; parental and family; social pressures such as poverty, unemployment, substance misuse, homelessness, racism, stereotypes

*Influences:* peer pressure, fashion and trends; on individuals and groups including ethnicity, religion, media; internet

*Factors affecting crime:* social climate; environment including poverty, housing, education, ethnicity, unemployment; financial influences; victimisation and repeat victimisation

*Impact of crime on victims and society:* public and third sector organisations which support victims including victim support, social services; pressures felt by victims; impact of crime on victims including physical and emotional impact; impact of crime on society including financial; fear of crime; criminal justice system

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand different approaches to psychology	1.1 review major approaches to psychology 1.2 evaluate key personality theories
LO2 Understand how psychology can be used to benefit the individual and the organisation	2.1 analyse how a knowledge of psychology can benefit individuals 2.2 explain how knowledge of behaviour theories can support organisations 2.3 evaluate approaches to conflict management
LO3 Understand the causes and consequences of prejudice and discrimination	3.1 explain the origins of prejudice and discrimination 3.2 evaluate the consequences of discrimination and prejudice on individuals and organisations 3.3 explain how an individual could comprehend and control their own prejudices
LO4 Understand the major theories of criminal behaviour and causal factors	4.1 review the major theories of criminal behaviour 4.2 explain the causal aspects of criminal behaviour 4.3 assess influences and factors which may account for criminal activity 4.4 evaluate the impact of crime on victims and society.

## Guidance

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### Essential requirements

There are no essential or unique resources required for the delivery of this unit.

### Delivery

This unit can be delivered in a variety of ways. Case studies, videos, role play, learner-centred learning and live data can all be used to enhance the delivery and learning for this unit.

### Assessment

Evidence of outcomes could be achieved through:

- group tasks evaluating different approaches to psychology and their usefulness within a public service
- reports containing learners' evaluation of the causes and consequences of prejudice and discrimination
- reports containing learners' evaluation of the major theories of causes of criminal behaviour.

### Employer engagement and vocational contexts

Guest speakers, such as criminal psychologists, would help enhance the delivery of this unit.



# Unit 26: The Global Environment

Unit code:	D/502/9489
QCF level:	5
Credit value:	20
Guided Learning Hours:	60

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## Aim

The aim of this unit is to develop learners' understanding of major global economic and environmental issues as well as areas of current conflict. Learners will also learn about different international organisations and their political systems as well as how the media impacts on the public services.

## Unit abstract

Learners will explore major current economic and environmental issues and the impact they can have on the global economy. Current conflicts from around the globe will also be explored, with learners investigating the causes, impact and involvement of both national and international organisations. Learners will examine key international organisations and how they work with differing political systems. This will develop learners' understanding of how regime change can occur and how international organisations manage these changes.

Learners will also investigate the impact of communications media on the portrayal of national and global events and the work of the public services.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the major economic and environmental issues in a global context
- 2 Understand current global conflicts
- 3 Understand how international organisations work with differing political systems
- 4 Understand the impact of communications media on global issues.

## Unit content

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### 1 Understand the major economic and environmental issues in a global context

*Major economic issues:* employment; poverty; recession; Gross Domestic Product /Gross National Product; barriers to trade and globalisation; developing world debt; impact of economic issues on countries

*Major environmental issues:* global warming and associated problems; flooding; drought; pollution; transport; emissions; disease

*Solutions:* actions by international organisations including trade restrictions/removal of trade barriers, quotas; strategies for sustainable development including Rio Earth Summit (1992) and Agenda 21; UK Government strategies including 'Securing the Future'; current EU strategies including directives and legislation

### 2 Understand current global conflicts

*Different ideologies:* political; religious; nationalism; fundamentalism; links to conflicts, e.g. Iraq, Afghanistan, Rwanda, Balkan States

*Causes of conflict:* including politics, nationalism, religion, ideology, land and resources, historical rivalry, ethnic conflict

*Links to terrorism:* e.g. Northern Ireland, Iraq, Afghanistan, IRA, PIRA, al-Qaeda; terrorist atrocities, Omagh, 9/11, London Bombings, Chechnya, changes in terrorism

*Impact of conflict on UK public services:* peacekeeping including ensuring the safety of the local population and fair elections, e.g. in Iraq, Bosnia, Sierra Leone; training, e.g. Iraq; security and evacuation of UK nationals

*Role of UK and international organisations:* UK public services including military, policing, border agencies; UK government; EU and joint EU public services including military, policing, border agencies; armed forces under auspices of NATO, UN; role of NATO, UN, UNICEF, WHO; rules of engagement, peacekeeping mandates

### 3 Understand how international organisations work with differing political systems

*Political change:* recent political change including collapse of communism, growth of the EU, Iraq, Afghanistan, African States, military regimes, e.g. Burma

*International organisations and their roles:* NATO, UN, EU; roles in specific countries; humanitarian role of international institutions including humanitarian aid programmes, disaster relief, peacekeeping, reconstruction, providing for refugees and asylum seekers; international actions including war crimes tribunals, UN resolutions, imposition of sanctions, trade embargos, political pressure

### 4 Understand the impact of communications media on global issues

*Different forms of communications media:* television; radio; newspapers; film; electronic media; internet; social networking; speed of communication; accuracy; use; reach

*Communications media reporting for global issues:* bias; influence on outcomes; local; national; international; state owned; freedom of information; use of communications media by governments, individuals and other organisations, e.g. pressure groups, charities, terrorist groups

*Portrayal of public services in global issues:* in different events including conflict, humanitarian roles, terrorist activities; reporting of local and global issues concerning public services

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand the major economic and environmental issues in a global context	1.1 examine the major economic issues in the global environment 1.2 describe the effects of economic issues on countries 1.3 analyse current environmental issues in a global context 1.4 evaluate solutions used by national and international organisations for global environmental issues
LO2 Understand current global conflicts	2.1 explain how conflicts can be caused by differing ideologies 2.2 evaluate links between conflicts and terrorism 2.3 evaluate the impact of conflict on UK and international public service organisations 2.4 analyse the roles of national and international organisations in recent conflicts
LO3 Understand how international organisations work with differing political systems	3.1 examine recent examples of political change internationally 3.2 evaluate the effectiveness of international organisations' management of recent political change situations
LO4 Understand the impact of communications media on global issues	4.1 describe the different forms of communications media in today's society 4.2 analyse media reporting of recent global issues 4.3 analyse recent media portrayal of public services involved in global issues.

## Guidance

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### Essential requirements

Learners require access to a range of media relating to public services, for example, newspapers, TV, internet, radio.

### Delivery

This unit can be delivered in a variety of ways. Case studies, student-centred discussions and presentations will enhance delivery.

### Assessment

A range of different assessment methods would be suitable for this unit, including written reports, presentations or discussions.

### Employer engagement and vocational contexts

This unit would benefit from visits/guest speakers from both the military and the media. Links with charities which have had involvement in recent conflicts would also enhance delivery.



# Unit 27: Justice and Punishment

Unit code:	R/502/9490
QCF level:	4
Credit value:	15
Guided Learning Hours:	60

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## Aim

The aim of this unit is to develop learners' understanding of the criminal justice system in the UK and to evaluate the effectiveness of the criminal justice system.

## Unit abstract

This unit gives learners an opportunity to develop an understanding of the criminal justice system in terms of the composition and roles of the judiciary and magistracy. It enables learners to explore the principle of judicial independence and potential conflict between with the judiciary and the state and executive because of that independence.

The unit also covers how the agencies of the criminal justice system operate and how defendants are dealt with by the system. Learners will explore the ethical issues involved with sentencing and punishment. Learners will be required to consider the aims and costs of punishment in modern society.

Learners will also have the opportunity to evaluate the effectiveness of the criminal justice system in terms of different stages of dealing with offenders as well as evaluating any deterrent effect on re-offending.

## Learning outcomes

### On successful completion of this unit a learner will:

- 1 Understand the composition and roles of the judicial system
- 2 Understand how the judicial system is used for justice and punishment
- 3 Understand the ethical dilemmas surrounding sentencing.

## Unit content

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### 1 Understand the composition and roles of the judicial system

*Judiciary:* structure; social composition; processes of appointment; legal standing; authority; role; influence on policy; accountability; powers; guidelines

*Magistracy:* structure; social composition; processes of appointment; legal standing; authority; role; influence on policy; accountability; powers; guidelines

*Relationships:* between judges and magistrates; relationship between judiciary and government; government policies; role of the executive; role of parliament; principle of judicial impartiality; impact of government policies on judicial impartiality

### 2 Understand how the judicial system is used for justice and punishment

*System:* processes; structure; composition; personnel; inter-relationships

*Justice:* current policies; methodology used to combat crime; roles and responsibilities; fast tracking; repeat offending

*Prosecution of defendants:* strategies of criminal justice agencies including the police, courts, legal system, probation, prison service; Crown Prosecution Service (remit, focus, roles, responsibilities); court system for magistrates' courts, Crown courts, the Supreme Court including structure, features, sentencing; diversionary schemes and community alternatives; consequential deterrent effect on re-offending; role of probation service; role of prison service; role of witnesses in prosecution of defendants

### 3 Understand the ethical dilemmas surrounding sentencing

*Sentencing policies:* sentencing guidelines for judges and magistrates; issues of seriousness and severity; current policies and legislation relating to sentencing

*Perspectives on punishment:* goals/objectives; effectiveness; justification; deterrence; reform; prevention; retribution; impact on victims of crime; restorative justice

*Sentencing trends:* current trends; public confidence; risk management

*Costs:* available resources including physical, human, financial; costs of prosecution; sentencing; costs of imprisonment; other sentences including tagging

*Particular groups and their possible issues:* criminal justice and gender issues; racial issues; mentally disordered defendants; vulnerable people, young offenders; victims and witness

## Learning outcomes and assessment criteria

<b>Learning outcomes</b> <b>On successful completion of this unit a learner will:</b>	<b>Assessment criteria for pass</b> <b>The learner can:</b>
LO1 Understand the composition and roles of the judicial system	1.1 describe the appointment procedures for judges and magistrates 1.2 evaluate the implications of the appointment process for judicial independence 1.3 explain the accountability of the judiciary and magistracy with respect to justice and punishment 1.4 evaluate the principle of judicial impartiality
LO2 Understand how the judicial system is used for justice and punishment	2.1 describe the processes required to prosecute a defendant 2.2 explain the role of the criminal justice agencies 2.3 evaluate the effectiveness of alternative methods of dealing with offenders
LO3 Understand the ethical dilemmas surrounding sentencing	3.1 analyse the key issues that arise from the implementation of current sentencing legislation 3.2 analyse the impact of sentencing legislation on criminal justice 3.3 evaluate the objectives of punishment in a modern society 3.4 explain the relationship between sentencing trends and public confidence 3.5 explain how the costs of prosecution and sentencing impact on available resources.

## Guidance

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### Essential requirements

There are no essential or unique resources required for the delivery of this unit.

### Delivery

This unit can be delivered in a variety of ways. Case studies, student-centred learning and direct consultation with relevant areas of public services can all be used to enhance the delivery.

Visits to, for example, magistrates courts and Crown courts are an effective way of helping learners to understand how processes and procedures are put into practice. Visiting speakers can also be used to forge links with the public services and to widen participation in the learning process.

### Assessment

Evidence could be in the form of written or oral assignments.

Evidence is likely to be produced at learning outcome level although opportunities exist for covering one or more outcomes in an assignment.

Evidence could be in the form of:

- assignments – written reports or accounts of findings and the research conducted
- research into the legislation, policies and guidelines involved in dealing with offenders
- case studies – covering the ethical issues surrounding sentencing.

### Employer engagement and vocational contexts

Links with local agencies which could provide visiting speakers would enhance the delivery of this unit.

## Further information and useful publications

For further information about the qualifications featured in this specification, or other Pearson qualifications, or visit our website ([www.edexcel.com](http://www.edexcel.com)).

Key publications:

- Adjustments for candidates with disabilities and learning difficulties – Access and Arrangements and Reasonable Adjustments, General and Vocational qualifications (Joint Council for Qualifications (JCQ))
- Equality Policy (Pearson)
- Recognition of Prior Learning Policy and Process (Pearson)
- UK Information Manual (Pearson)
- UK Quality Vocational Assurance Handbook (Pearson).

All of these publications are available on our website.

## Professional development and support

Pearson supports UK and international customers with training related to BTEC qualifications. This support is available through a choice of training options offered in our published training directory, or through customised training at your centre.

The support we offer focuses on a range of issues including:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing learner-centred learning and teaching approaches
- building functional skills into your programme
- building in effective and efficient quality-assurance systems.

The national programme of training we offer is on our website at [www.edexcel.com/training](http://www.edexcel.com/training). You can request customised training through the website or you can contact one of our advisers in the Training from Pearson team via Customer Services to discuss your training needs.

### **BTEC training and support for the lifetime of the qualifications**

**Training and networks:** our training programme ranges from free introductory events through sector-specific opportunities to detailed training on all aspects of delivery, assignments and assessment. In addition, we have designed our new network events programme to allow you to share your experiences, ideas and best practice with other BTEC colleagues in your region. Sign up to the training you need at: [www.btec.co.uk/training](http://www.btec.co.uk/training)

**Regional support:** our team of Curriculum Development Managers and Curriculum Support Consultants, based around the country, are responsible for providing advice and support in centres. They can help you with planning and curriculum developments. Call **0844 576 0027** to contact the curriculum team for your centre.

### **Your BTEC Support team**

Whether you want to talk to a sector specialist, browse online or submit your query for an individual response, there is someone in our BTEC Support team to help you whenever – and however – you need, with:

- Welcome Packs for new BTEC centres: if you are delivering BTEC for the first time, we will send you a sector-specific Welcome Pack designed to help you get started with these qualifications
- Subject Advisers: find out more about our subject adviser team – immediate, reliable support from a fellow subject expert – at: [www.edexcel.com/subjectadvisors](http://www.edexcel.com/subjectadvisors)
- BTEC Hotline: call the BTEC Hotline on 0844 576 0026 with your query
- Ask the Expert: submit your question online to our Ask the Expert online service ([www.edexcel.com/Aboutus/contact-us/ask-expert/Pages](http://www.edexcel.com/Aboutus/contact-us/ask-expert/Pages)) and we will make sure your query is handled by a subject specialist.

# Annexe A

## Glossary of accreditation terminology

<b>Accreditation start/end date</b>	The first/last dates that Pearson can register learners for a qualification.
<b>Certification end date</b>	The last date on which a certificate may be issued by Pearson.
<b>Credit value</b>	All units have a credit value. The minimum credit value that may be determined for a unit is one, and credits can only be awarded in whole numbers. Learners will be awarded credits for the successful completion of whole units.
<b>Guided Learning Hours (GLH)</b>	Guided learning hours are defined as all the times when a tutor, trainer or facilitator is present to give specific guidance towards the learning aim being studied on a programme. This definition includes lectures, tutorials and supervised study in, for example, open learning centres and learning workshops. It also includes time spent by staff assessing learners' achievements. It does not include time spent by staff in day-to-day marking of assignments or homework where the learner is not present.
<b>Learning Aims Database</b>	Link to the Learning Aims Database, which features detailed funding information by specific learning aim reference.
<b>Learning Aim Reference</b>	Unique reference number given to the qualification by the funding authorities on accreditation.
<b>Level</b>	The level at which the qualification is positioned in the Qualifications and Credit Framework (QCF).
<b>Qualification Number (QN)</b>	Unique reference number given to the qualification by the regulatory authorities on accreditation.
<b>Register of Regulated Qualifications</b>	Link to the entry on the Register of Regulated Qualifications for a particular qualification. This database features detailed accreditation information for the particular qualification.
<b>Section 96</b>	Section 96 is a section of the Learning and Skills Act 2000. This shows for which age ranges the qualification is publicly funded for under-19 learners.

<b>Title</b>	The accredited title of the qualification.
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# Annexe B

## BTEC Specialist and Professional qualifications

BTEC qualifications on the NQF	Level	BTEC Specialist and Professional qualifications on the QCF	BTEC qualification suites on the QCF
<b>BTEC Level 7 Advanced Professional qualifications</b> BTEC Advanced Professional Award, Certificate and Diploma	<b>7</b>	<b>BTEC Level 7 Professional qualifications</b> BTEC Level 7 Award, Certificate, Extended Certificate and Diploma	
<b>BTEC Level 6 Professional qualifications</b> BTEC Professional Award, Certificate and Diploma	<b>6</b>	<b>BTEC Level 6 Professional qualifications</b> BTEC Level 6 Award, Certificate, Extended Certificate and Diploma	
<b>BTEC Level 5 Professional qualifications</b> BTEC Professional Award, Certificate and Diploma	<b>5</b>	<b>BTEC Level 5 Professional qualifications</b> BTEC Level 5 Award, Certificate, Extended Certificate and Diploma	<b>BTEC Level 5 Higher Nationals</b> BTEC Level 5 HND Diploma
<b>BTEC Level 4 Professional qualifications</b> BTEC Professional Award, Certificate and Diploma	<b>4</b>	<b>BTEC Level 4 Professional qualifications</b> BTEC Level 4 Award, Certificate, Extended Certificate and Diploma	<b>BTEC Level 4 Higher Nationals</b> BTEC Level 4 HNC Diploma
<b>BTEC Level 3 qualifications</b> BTEC Award, Certificate, Extended Certificate and Diploma	<b>3</b>	<b>BTEC Level 3 Specialist qualifications</b> BTEC Level 3 Award, Certificate, Extended Certificate and Diploma	<b>BTEC Level 3 Nationals</b> BTEC Level 3 Certificate, Subsidiary Diploma, Diploma and Extended Diploma

<b>BTEC qualifications on the NQF</b>	<b>Level</b>	<b>BTEC Specialist and Professional qualifications on the QCF</b>	<b>BTEC qualification suites on the QCF</b>
<b>BTEC Level 2 qualifications</b> BTEC Award, Certificate, Extended Certificate and Diploma	<b>2</b>	<b>BTEC Level 2 Specialist qualifications</b> BTEC Level 2 Award, Certificate, Extended Certificate and Diploma	<b>BTEC Level 2 Firsts</b> BTEC Level 2 Certificate, Extended Certificate and Diploma
<b>BTEC Level 1 qualifications</b> BTEC Award, Certificate, Extended Certificate and Diploma	<b>1</b>	<b>BTEC Level 1 Specialist qualifications</b> BTEC Level 1 Award, Certificate, Extended Certificate and Diploma	<b>BTEC Level 1 qualifications</b> BTEC Level 1 Award, Certificate and Diploma (vocational component of Foundation Learning)
	<b>E</b>	<b>BTEC Entry Level Specialist qualifications</b> BTEC Entry Level Award, Certificate, Extended Certificate and Diploma	<b>BTEC Entry Level qualifications (E3)</b> BTEC Entry Level 3 Award, Certificate and Diploma (vocational component of Foundation Learning)

**NQF** = National Qualifications Framework

**QCF** = Qualifications and Credit Framework

<b>QCF qualification sizes</b>	
<b>Award</b>	1–12 credits
<b>Certificate</b>	13–36 credits
<b>Diploma</b>	37+ credits



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For more information on Edexcel and BTEC qualifications please visit our websites: [www.edexcel.com](http://www.edexcel.com) and [www.btec.co.uk](http://www.btec.co.uk)

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