Food Technology Progression Guide - Moving from GCSE to GCE and beyond

Introduction

The GCSE Design and Technology: Food Technology and the GCE Food Technology are two specifications offered by Edexcel that provide centres with a progression from one Food Technology qualification to another. With these qualifications there is a smooth transition from GCSE through AS Level to A2. As the specifications are progressive there are a number of factors that a centre can take into account, to ensure this smooth transition from one qualification to another.

Theoretical Knowledge

There are considerable overlaps of theoretical knowledge between the GCSE and AS and A2 units with the majority of these overlaps coming between the GCSE specification and the AS sections of the GCE specification. However, as can be seen from the general overview below, there are some areas of similarity with A2.

(An example of how student responses would change at the different levels is given later in this document).

Centres are reminded that the key documentation in all these qualifications is the relevant Specifications as published by Edexcel. At both the GCSE and GCE levels, the theoretical knowledge elements of the specifications are laid out in a very similar way in sections under distinct headings. In both the GCSE and the GCE Specifications the wordings of the key sentences at the start of each section (the stems), are very similar, but, when looking at the actual content of the material, teachers will see that the essence of the subject matter remains the same, but varies in depth and detail from one specification to another.

GCSE and AS Specifications as an example

GCSE D&T: Food Technology (5FT01) **GCSE Unit 2: Knowledge and Understanding of Food Technology**	**GCE D&T: Food Technology (8FT01)** **GCE AS Unit 2: Design and Technology in Practice**	**GCE D&T: Food Technology (9FT01)** **GCE A2 Unit 3: Food Products, Nutrition and Product Development**
Nutrition	Materials, components/ingredients and working properties	Food Commodities, chemical composition and application of manufacturing processes.
Primary and Secondary Food	Industrial and commercial Practice	Nutrition
Preservation and Processing	Quality	Product development and food innovation
Product Manufacture		
Analysing Products		

A PEARSON COMPANY

Students are expected to develop knowledge and understanding of a wide range of materials /ingredients/ components, nutrition, equipment, processes, current health issues and technological development used in design and technology.

At GCE AS level, students are expected to extend their knowledge and understanding of a wide range of materials, components, additives and processes used in the design and production of food products.

Content comparison between GCSE and GCE

At *GCSE Topic 1: Nutrition* a fundamental knowledge and understanding of nutrition allows students to demonstrate the basic knowledge of the macro (Protein, Fats and Carbohydrates) and micro (Vitamins and Minerals) nutrients, their dietary functions, sources and deficiencies. This allows students to apply their knowledge and understanding of nutrition to the principles of healthy eating and current dietary guidelines and recommendations. Individual nutritional requirements are explored using this knowledge base, to allow students to make decisions about menu planning, modifying recipes and ingredients to suit user needs, whether they are user groups categorised by age, individual nutritional need, special diets or the customs and cultures of ethnic and religious groups.

For example:
GCSE Level
1.1 The dietary function and sources of the following fats:

- Saturated
- Unsaturated
  - Polyunsaturated
  - Essential fatty acids.

At *GCE AS level*, each of the macronutrients are explored in further detail, focussing on the chemical name, nature and basic characteristics of each of the macro nutrients.

For example:
GCE AS Level
2.3 The chemical nature and basic characteristics of the following fats:

- Simple fats: Natural fats, Mixed triglycerides, Saturated fatty acids, Monounsaturated fatty acids, Polyunsaturated fatty acids
- Monoglycerides
- Diglycerides

The basic characteristics of:

- Hardening oils by hydrogenation
- Essential fatty acids in the diet
- Monoglycerides and diglycerides used as emulsifying agents
- Rancidity: hydrolytic and oxidative

At GCE level, students are expected to know and understand these nutrients in greater depth than at GCSE, through the application of knowledge and understanding within specific contexts of study at GCE level. The GCE examiners are expecting to see in the AS/A2 responses well-justified statements of how and why these particular macronutrients might be used in Food Technology. The key issue with these topics is that the student's attention should be drawn to the stem of the statement at the beginning of each section. The AS students should justifying and explain and refer more to industrial and commercial situations rather than school test kitchen experience when responding to questions in the

A PEARSON COMPANY

examination paper. Disassembly of existing products, practical investigations and experimentation are excellent modes of delivery for these areas of the courses, giving students the opportunity to view at first hand the consequences of choosing and/or using food products for specific purposes and the effects on the working characteristics or properties of these components.

The GCE specification then moves from the macronutrients to other components and additives, with focus on the sensory, physical, storage, nutritional and processing characteristics of other components and additives. This develops from Topic 3 in the GCSE Specification, where students explore how additives and standard components are used in both home and industry food processing, using knowledge and understanding of the functional properties of additives that change.

GCSE Level Topic 2: Primary and secondary foods The progression from GCSE to GCE can be seen by the initial understanding of primary and secondary foods as the main food components at GCSE level and the functional and working characteristics of these food components, leading onto the development of their physical nature and working properties at GCE level.

For example, in the *GCSE Topic 2: Primary and secondary foods* section of the Specification, students are required to study the:

Properties and working characteristics of raw materials and ingredients and how their properties affect finished products.

Whereas at AS Level (Unit 2), students are required to learn:

Fundamental working properties of…(each of the macro-nutrients).
The wording reflects the progression of knowledge and understanding from GCSE to GCE, moving from terminology such as thickening and gelatinisation, caramelisation and browning at GCSE level, to the importance of hydrogen bonding in gelatinisation, retrogradation and syneresis, stabilising and browning reactions: caramelisation and maillard reaction at GCE level.

At GCE A2 level, this is developed further in Unit 3:
Food commodities, chemical composition and application of manufacturing processes.
These topics lend themselves to practical work, whether it is specific focussed tasks for the whole class, investigational work within groups or individual research.

GCSE Topic 3: Preservation and processing focuses on the acquisition of knowledge and understanding of the principles of food preservation: food spoilage, food poisoning, food hygiene, kitchen hygiene, personal hygiene and food legislation (The Food Safety Act 1990 and Food Hygiene Regulations 2006). This is a common area within both the GCSE and GCE specifications, where detail regarding the nature and application of microbiology within Food Technology is found at a basic level for GCSE level, and developed further for GCE level, despite the content remaining the almost the same. Typically the GCSE specification remains focused on the use of preservation, preparation and processing within a domestic and industrial context.

For example:
GCSE level: 'Names, uses, advantages/disadvantages and safety issues are the main focus for preparation, processing and preservation within the home and industry.'

A PEARSON COMPANY

This allows students the opportunity to make realistic comparisons between the two areas of study, with applications of knowledge of familiar settings within home and school kitchens, but also making use of Internet research and school visits to see how methods vary between home and industry.

GCE Unit 2: Industrial and commercial practice focuses on the same content, but the depth of knowledge reflects the different assessment level.

GCE AS Level: 'Stages in the commercial manufacture of food products, the basic principles of each process and its application.'

Practical work, case studies, visits, textbooks and Internet research are excellent modes of delivery for these areas of the courses.

GCSE Topic 4: Product Manufacture requires knowledge and understanding of the different aspects of product manufacture within the food industry and the factors that determine use, choice, safety and quality within the following topics.

- Production methods
- Product and recipe development
- Technological changes and innovations
- Food issues: moral, environmental and cultural issues
- Quality
- ICT
- Packaging
- Labelling.

The content remains very similar at GCE level, but with greater depth and detail.
For example:
GCSE Level: 'Quality within the food industry: Quality control, assurance, manufacture and design.'
GCE Level: 'The principles and application of good manufacturing practice: Quality control, assurance, producing product specifications, risk assessment/HACCP and Food Safety Acts.

GCSE Topic 5: Analysing Products requires students to understand why product analysis is an important part of product development. Investigation, disassembly, functionality of ingredients, specifications, product comparison, moral issues, quality of design and manufacture form the basis of how to analyse food products to understand how a designer was inspired to create the product and used product development to produce a new innovative product. This part of the course provides the framework for GCSE Unit 1: controlled assessment/coursework. There is also an overlap with *GCE A2 Unit 3 Food Products, nutrition and product development*, where students develop a knowledge and understanding of a range of food commodities, aspects of nutrition, product development and food innovation. Moving from basic knowledge at GCSE level, students at GCE AS level will develop a comprehensive knowledge base of the main food commodities, their composition, basic processing and typical spoilage patterns. This will allow them to apply this knowledge at GCE A2 level to diet, contemporary lifestyle issues and new product development, to understand how consumer behaviour, demographics, modern lifestyles and sustainable issues influence new product development. It is also important at A2 level that students are aware of the influence of new technologies and materials on the development of new food products. This will have been acquired at a basic level at GCSE level, and developed further for A2: biotechnology, novel, functional, and man-made materials within the food industry.

A PEARSON COMPANY

Food commodities/materials

When it comes to the food commodities/materials that are often used in the creation of recipes and food products, the wording in the specifications is very similar, but with some minor differences.

At GCSE level students are expected to acquire knowledge of 'the nutritional content, uses, types and functional properties of the following primary and secondary foods:'

- Meat, fish and alternative protein foods
- Milk and Dairy products
- Fruit and vegetables
- Eggs
- Fats and oils
- Sugar
- Cereals.

At GCE level, 'characteristics, structural composition, characteristic spoilage, processes and nutritional contribution to the diet of the following foods:

- Meat and fish
- Dairy products
- Fruit and vegetables
- Eggs
- Sugar
- Fermented products
- Cereals.

Practical Tips when approaching questions

When a student moves from GCSE to AS and then to A2, the way in which they are expected to respond at different levels varies. As students move through the qualifications the answers produced by students should be more complex demonstrating a deeper knowledge and understanding of the subject matter.

For instance, taking**,** one of the processes mentioned in the "preparation techniques" sections of both the description of combining methods would be sufficient to gain credit. This description might include basic statements describing the mixing and combining process. A student might state that mixing and combining processes are used to blend a range of ingredients together to form a uniform mix. This would involve the use of specialist equipment such as dough mixers to make pastes and dough using Z blades to blend different consistencies of mixtures within industry; or within a domestic situation, the use of named pieces of equipment (small, large, electrical or manual equipment) used in mixing and combining processes. At this level, a student might well have used a food processor or free standing mixer in class and a description of that experience would suffice to gain the marks.

At GCE Level however, the student would be expected to include not only the factors mentioned in the GCSE response but would be required to add extra details. A student would need to mention more detailed information including such factors as methods for mixing solids: tumblers and ribbon blenders or methods for mixing liquids: propellers or blades. The method of mixing, equipment, consistencies and tolerances would provide an application of knowledge in commercial practice. The student would also be expected to discuss the problems of under or over mixing, irregular stirring for liquid mixes to create better mixing and a smoother texture. The final response would be a far more technical piece of work.

A PEARSON COMPANY

It is very important to realize that to gain ultimate success at GCE requires the extra piece of knowledge and information.

The GCSE and GCE papers are marked via the Internet using a secure system, because of this system the examination papers for both qualifications are laid out in a very similar way. The questions and the student responses are contained within the same paper; centres do not need to hand out sheets of lined paper and there should be no need for extra sheets to be given out. The spaces provided for the responses have been carefully worked out so that there is the right amount of room available. This also means that there should be no reason for students to write in the margins of papers. Where students are asked to produce diagrams, again there should be enough space for the response without the student going over the lines and into the margin.

In both the GCSE and GCE papers there are particular things that a student needs to look out for when they are reading the questions.

Firstly, a student should look at what are referred to as command words. Usually in a question, a stem is written to set the scene and then the questions appear following the stem. The questions nearly always start with a command word.

These command words are similar at both GCSE and GCE. They are:

Command word	Marks awarded	Description
Give/State/Name	1 Mark	These types of questions will usually appear at the beginning of the paper or question part and are designed to ease students into the question with a simple statement or short phrase.
Describe/Outline	2+ Marks	These types of questions are quite straightforward. They ask students to describe something in detail. Some questions may also ask students to use notes and sketches. They can gain marks with the use of a clearly labelled sketch.
Explain/justify	2+ Marks	These types of questions are asking students to respond in detail to the question. No short phrases will be acceptable here. Students must make a valid point and then develop or justify it to gain full marks.
Evaluate/discuss/compare	4+ Marks	These questions are designed to stretch and challenge students. They will always be awarded the most amounts of marks because they require students to make well-balanced arguments that usually involve both advantages and disadvantages. Because the papers are ramped, the Evaluate /discuss/compare question, always carry the most marks and are usually at the end of a paper.

A PEARSON COMPANY

The questions and the papers at both GCSE and GCE are ramped. That is, as the student moves through the paper the questions become progressively harder. This ensures a progression through the GCSE papers and then through the AS and A2 levels.

On both the GCSE and the GCE question papers, at the end of each sub-section, the number of marks allocated to that particular section is given. This helps to guide the student into giving some indication of the number of points that will need to be made in that particular section. For example, if the number of marks is indicated thus: (4) and the question has the command word "justify" the response expected would be "the point given (1) and three justification points (1) + (1) + (1) = 4 marks in total".

Coursework

Both GCSE and GCE have coursework elements within their respective specifications. With the GCSE Design and Technology: Food Technology students are required to select the areas they are going to produce work for from lists provided by Edexcel that are included in the relevant Specifications.
With both the GCSE and the GCE Food Technology Specifications the coursework tasks are Creative Design and Make Activities. Creativity is a fundamental part of design and technology. Many designers believe the quality of the initial idea and thought-provoking innovative design to be cornerstones of every successful product. The creative design and make activities within these units at GCSE and GCE seek to develop creativity and confidence in the student's ability to think, question, explore, create and communicate. Combining knowledge and understanding with creative, practical and technical skills, these activities are intended to provide breadth in learning and depth in the application of practical and transferable skills.

GCSE Coursework Creative Design and Make Activities	**AS Coursework Portfolio of Creative Skills**	**A2 Coursework Commercial Design**
• Analysis of brief • Research • Specification • Design • Review • Communication • Develop • Final Design • Plan • Make • Quality • Health and Safety • Test and Evaluate	**Product Investigation** •Performance analysis •Materials and/or components •Manufacture •Quality **Product Design** • Design and development • Communicate **Product Manufacture** • Production plan • Making • Testing	*Commercial Design* *Own choice with a client* • Research and Analysis • Product Specification • Design • Review • Develop • Communicate • Planning • Making: use of tools/quality/complexity • Testing and Evaluating

The table shows the areas that need to be included in the various coursework tasks at GCSE, AS and A2. Although the headings of the various sections are slightly different, it can clearly be seen that the elements expected for the various qualifications are broadly similar. All specifications require analysis, product specification, design, make and test and evaluate activities.

At all levels, work is marked in centers by teachers and then moderated by Edexcel.

A PEARSON COMPANY

The Food Technology specification is part of the D&T suite of courses that have a modular structure, which means Centers have real flexibility over what they teach when and choice to enter students for assessment. It allows teachers to 'chunk' the teaching and bank results. It also means that if a re-sit is needed, the Resultsplus feedback can be used to ensure students do better the second time because the teacher and student know where improvement is needed.

GCSE Coursework
Creative Design and Make Activities

Students studying for the GCSE Design and Technology: Food Technology Specification is required to produce a coursework project that is derived from a list of tasks published by Edexcel. These tasks will appear each year on the Edexcel website. Students are then required to produce their work under controlled conditions. Details of the controlled conditions required are published in the Specification.

Students are required to complete a design and make activity. These activities can be linked in a "traditional" combined design and make project or separate where students can design one product and make another. The choice of which direction students take will probably be up to the teachers in the centres. Whatever route is chosen, either is a sound basis for the later AS and A2 coursework tasks.

If students produce a traditional design and make project, it will be a sound foundation for the A2 project at GCE and if they go down the separate design and make route, it will be a good foundation for the AS element of the GCE course.

At GCSE, students should be encouraged to develop high quality designing skills and high quality making skills by producing a range of dishes, which will fulfil the set task.

The GCSE coursework, whichever approach is taken is a good basis and preparation for the next stage, the AS level coursework assignments. It is a good introduction to the high standard of design and making and helps potential GCE students to approach a variety of design and make techniques using different skills and processes.

AS Coursework
Portfolio of Creative Skills

In this unit students are given the opportunity to develop their creative, technical and practical skills through a series of product investigation, design and manufacturing activities.

Students will produce one portfolio with three distinct sections, which will demonstrate their creativity and flair when investigating, designing and making product(s). Ideally different products should be chosen for the three distinct sections as students are not being asked to carry out one large design and make exercise, but three smaller and more focused tasks which together provide a detailed portfolio of their skills. The AS coursework is divided into three specific areas:

- Product Investigation
- Product Design
- Product Manufacture.

The product investigation and product design briefs may be given to students by the teacher, or students may define their own. The product manufacture design brief should

A PEARSON COMPANY

be set by the teacher to ensure a range of materials/components/ingredients; techniques and processes are used when manufacturing a range of products.

Product Investigation Task: Students are expected to undertake a thorough product analysis of an existing commercial food product within the Product Investigation task. Students should take into consideration the intended function and performance of the product, the materials/ ingredients/ components and processes used during its manufacture, how it was produced and how its quality was assured. Although students may investigate a range of different products over the course of their AS studies, evidence of one complete product investigation is submitted.

Product Design Task: The designing element of the AS qualification can be a "blue sky" design project or a focused design brief for a specific need/want. The idea is for the design experience of GCSE to be built upon. Students should be encouraged to produce a range of alternative ideas that explore different approaches to the problem. Using the best aspects of their initial ideas, they will develop and refine their ideas with the aid of modelling (practical work), experimentation, investigation, recipe development and innovation into a final workable design proposal that will satisfy the design brief(s)/need(s). Once their idea(s) has been fully developed into viable product(s) they must communicate their design intentions to potential users. This gives students the opportunity to respond creatively and adventurously at both the design and develop stages of product design. Use of ICT packages, CAD, nutritional analysis programmes, food photography, sketching, annotation and modelling are all excellent methods of communicating design intentions. Students should be encouraged to have a more integrated approach to their designing. This is designed to "bridge the gap" between GCSE and A2 where a professional designing approach is expected.

Product Manufacture task: The make exercise is designed to develop student's making skills. The making task must be set by the teacher. Again this task directly follows on from the GCSE standard and is building on that knowledge ready for moving onto GCE. Here the students are expected to produce one or more high quality food products to satisfy given design brief(s)/need(s). The design brief(s)/need(s) should contain requirements against which the final manufactured product(s) can be measured. Students test their practical outcomes to check their performance and quality. Students should use a range of ingredients, skills, techniques and processes when manufacturing the range of products in order to build and develop a variety of skills and lay the foundation for more complex and challenging work in the future.

A2 Coursework
Commercial Design

The A2 Coursework is a full 'design and make' activity. It is an opportunity to apply skills students have acquired and developed throughout their course of study to design and make a food product of their choice. It should be a project that is intended for commercial production. Students must adopt a commercial design approach to their work, reflecting how a professional might deal with a design problem and its resolution. The choice of design brief should have a real commercial use, in that it should be useful to a wider range of users beyond an individual, unless it has been specifically commissioned as a 'one off'. The design brief should provide opportunities for a client or user group to have an input into decision-making at various stages of the design and make process. When compared to the GCSE design and make project, the major difference between that and the A2 project is that the A2 project must have a "client or user group". This is any third party identified by a student that is referred to and who can give informed critical feedback at various stages throughout the design process. It is essential that the client

A PEARSON COMPANY

must be seen to be taking an active part in the process. They must be kept informed of how the work is going and they should be referred to and evidenced throughout the portfolio of work. Photographic evidence, client feedback, discussion and sensory testing should be included in the student's folder.

In the A2 projects the moderators are looking for a high level of work. Design and Development pages should be full of ideas. The pages need to be busy, with evidence that ideas are adventurous and creative. There should be reference to industrial and commercial practices and evidence of how the product should be manufactured on an industrial scale.

A key feature of this unit is that students consider issues related to sustainability and the impact their product may have on the environment. A student may choose to design and make a sustainable product, but if they do not, they should consider the issues of sustainability at relevant points in their design and make activities. This could include materials, components, ingredients production and selection, manufacturing processes, use of the product and its disposal/recycling. For example transportation, food miles, fair trade, carbon footprint, waste, and packaging, use of fuel and water and air pollution.

When it comes to the practical work, "high level making skills" must demonstrate accuracy and precision in their use. Practical work in Food Technology is seen throughout the design, develop and making sections of the assessment criteria at GCSE and GCE levels. A detailed production plan that considers the main stages of manufacture in the correct sequence appropriate to the scale of production, with realistic and achievable time scales, quality and safety issues shown and justified will be shown for the final design proposal. It is very important that this is looking forward and not retrospective, thumbnail pictures of making help to provide evidence of manufacture. Use digital photography to record the making of the product. Finally, a range of tests must be justified and carried out to check the performance and quality of the final product. Third party evaluation, objective evaluative comments referencing the technical and measurable points on the specification allow students to judge the performance and quality of the final design product. A relevant and useful lifecycle assessment should be carried out on the final product to check its sustainability.

The final part of this activity is the testing and evaluation. This section must be carried out honestly, with reference to the client and their original design specification. Students must not be afraid of stating that there were problems or some things did not go quite as well as they should have done. If there have been problems, students should admit to them and then suggest ways in which those problems could be overcome or the design improved.

When it comes to the GCE coursework, the moderators are looking for a high standard of creativity and a high standard of finish in student's work.

With all the Food Technology courses, both at GCSE and GCE the students should be aware of the need to demonstrate skill, knowledge and understanding throughout the design process.

Resources

There are a number of sources that are available for the teachers of Food Technology specifications. Edexcel have on their website for GCSE Design and Technology: Food Technology and the GCE Food Technology a number of teacher guides and exemplar

A PEARSON COMPANY

material. See: http://www.edexcel.com and follow the links to the various subject specific pages.

Internet:
www.foodforum.org.uk
www.food.gov.uk
www.hse.gov.uk
www.ifst.org
www.nutrition.org.uk
www.bsi-global.com

Books:
The following are the books that have been written to go with the Edexcel GCSE Design and Technology: Food Technology and the GCE Food Technology courses:

Proudlove R K: The Science and Technology of Foods
Fox and Cameron: Food Science, Nutrition and Health
Garbutt J: Essentials of Microbiology
Hallam E: Understanding Industrial Practices in Food Technology
Howard and Prisk: Science Experiments in Food and Textiles
Woodman A & Manser S: Edexcel GCSE Food Technology Book (To be published spring 2010)

A PEARSON COMPANY