

Cambridge TECHNICALS LEVEL 3

LABORATORY SKILLS

Cambridge
TECHNICALS
2016

Unit 17 – Food technology
DELIVERY GUIDE

Version 1

CONTENTS

Introduction	3
Related Activities	4
Key Terms	5
Misconceptions	8
Suggested Activities:	
Learning Outcome 1 (LO1) Understand the main features of food manufacturing operations	10
Learning Outcome 2 (LO2) Understand the importance of food safety in food manufacture	11
Learning Outcome 3 (LO3) Understand the importance of quality control in food manufacture	12
Learning Outcome 4 (LO4) Be able to test product samples	13

INTRODUCTION

This Delivery Guide has been developed to provide practitioners with a variety of creative and practical ideas to support the delivery of this qualification. The Guide is a collection of lesson ideas with associated activities, which you may find helpful as you plan your lessons.

OCR has collaborated with current practitioners to ensure that the ideas put forward in this Delivery Guide are practical, realistic and dynamic. The Guide is structured by learning outcome so you can see how each activity helps you cover the requirements of this unit.

We appreciate that practitioners are knowledgeable in relation to what works for them and their learners. Therefore, the resources we have produced should not restrict or impact on practitioners' creativity to deliver excellent learning opportunities.

Whether you are an experienced practitioner or new to the sector, we hope you find something in this guide which will help you to deliver excellent learning opportunities.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email resources.feedback@ocr.org.uk.

OPPORTUNITIES FOR ENGLISH AND MATHS SKILLS DEVELOPMENT

We believe that being able to make good progress in English and maths is essential to learners in both of these contexts and on a range of learning programmes. To help you enable your learners to progress in these subjects, we have signposted opportunities for English and maths skills practice within this resource. These suggestions are for guidance only. They are not designed to replace your own subject knowledge and expertise in deciding what is most appropriate for your learners.



Please note

The timings for the suggested activities in this Delivery Guide **DO NOT** relate to the Guided Learning Hours (GLHs) for each unit.

Assessment guidance can be found within the Unit document available from www.ocr.org.uk.

The latest version of this Delivery Guide can be downloaded from the OCR website.

UNIT AIM

Food technology is an important branch of food science that deals with the production processes that make foods. This unit will allow you to investigate a selected range of food manufacturing sectors appropriate to your needs and resources available within your educational establishments.

The aim of this unit is to allow you the opportunity to investigate the fundamental and generic aspects of food manufacture and the links between sectors.

To underpin this, you will develop knowledge of food manufacturing operations, generic stages of food production and quality including food safety whilst further investigation will allow a greater knowledge base of one of the food manufacturing sectors.

You will prepare and test real product samples in the laboratory following correct health and safety procedures and using appropriate sampling techniques. You will report your findings as if to a relevant authority such as the manufacturer or regulatory agency.

Unit 17 Food technology

LO1	Understand the main features of food manufacturing operations
LO2	Understand the importance of food safety in food manufacture
LO3	Understand the importance of quality control in food manufacture
LO4	Be able to test product samples

To find out more about this qualification, go to: <http://www.ocr.org.uk/qualifications/vocational-education-and-skills/cambridge-technicals-laboratory-skills-level-3-introductory-diploma-diploma-05847-05849-2016-suite/>

Cambridge
TECHNICALS
2016

2016 Suite

- New suite for first teaching September 2016
- Externally assessed content
- Eligible for Key Stage 5 performance points from 2018
- Designed to meet the DfE technical guidance

RELATED ACTIVITIES

The Suggested Activities in this Delivery Guide listed below have also been related to other Cambridge Technicals in Laboratory Skills units/Learning Outcomes (LOs). This could help with delivery planning and enable learners to cover multiple parts of units.

This unit (Unit 17)	Title of suggested activity	Other units/LOs	
LO1	Identifying manufacturing sectors	Unit 19 Crop production and soil science	LO1 Understand how common crops are grown for commercial production in the UK
	Process flow development		LO2 Understand factors affecting the growth of cropst
LO2	Hand hygiene activity	Unit 6: Control of bio-hazards in the laboratory	LO2 Be able to use health and safety procedures to minimise the risk presented by hazards in a laboratory
	Food alerts	Unit 18 Microbiology	LO3 Be able to use microbiology in food production
	Contamination activity		LO1 Be able to classify and identify microorganisms

KEY TERMS

Explanations of the key terms used within this unit, in the context of this unit

Key term	Explanation
Aesthetic	Pleasing perception relating to the senses e.g. aesthetic properties of a cream cake.
Ambient	Storage description for room temperature e.g. biscuits are stored in an ambient environment.
Antibacterial	Working against or prohibiting the action of bacteria e.g. bleach as a cleaning agent.
Attribute	A characteristic quality or property used for measuring quality of products.
Authentic	Genuine, like the real thing e.g. authentic Italian ice cream.
Bespoke	Specially ordered as a one off in advance e.g. a wedding cake.
Brand	The name by which a product is known and sold, e.g. Heinz baked beans.
Brand Leader	A leading product that sets the standard against which others are judged e.g. Kellogg's corn flakes.
Chemical contamination	Contamination from a chemical substance e.g. insecticides, grease from engineers.
Chilled	Chilled foods are produced, cooked and rapidly chilled (-1 to 8 degrees C) as a means of preserving them e.g. sausage rolls.
Component	A part of a product or system e.g. an ingredient.
Concept	A general notion around which ideas are developed in new product development.
Consumer	Person who buys or uses food products and services.
Control	A means of checking that products meet the required standard e.g. shape, size, texture.
Control measure	Checks in a system or process needed to eliminate hazards e.g. metal detector.
Costing	The manufacturing or retail cost breakdown for food and drink products.
Critical Control Point (CCP)	Point or stage during manufacture where it is essential to control (reduce or eliminate) a hazard e.g. post cooking.
Cross contamination	The transfer of micro-organisms or physical contamination from one place, or food, to another.
Design brief	A short statement, description or set of instructions that outlines the product to be developed and the context in which it will be used.
Design criteria	The characteristics to which something is designed and against which it is evaluated.
Design specification	The exact details of the design ideas (specified).
Distribution	The process of transporting products from manufacturing units to retailers.
Exclusively	Sole or only, an exclusivity agreement prevents anyone other than the named parties being involved e.g. exclusive to Tesco.
Export	To carry, sell or send to another country e.g. British home grown asparagus.
Feasibility	How practical or possible something is e.g. do consumers want a new type of dessert in a supermarket.
Flow diagram	Step-by-step chart or plan of a system or food production process.
Food hygiene	Methods or systems for keeping foods safe to eat.

Explanations of the key terms used within this unit, in the context of this unit

Key term	Explanation
Food poisoning	Illness caused by bacteria in foods.
Frozen	Reduction in temperature to -5 degrees C and stored at approx. -18 degrees C e.g. ice cream.
HACCP	A risk assessment system used in the food industry for quality assurance purposes.
Hazard	Biological, chemical or physical agents that may cause harm (see individual examples).
High risk	High-risk foods can be defined as any ready-to-eat food that will support the growth of pathogenic bacteria easily and does not require any further heat treatment or cooking e.g. sliced ham.
Human Resources	Department used to recruit, manage and support others in staff related matters.
Imported	To bring from another country e.g. spice ingredients.
Input	Information energy or materials that pass into a system.
Labour intensive	Needing a lot of work e.g. hand-made chocolate.
Low risk	Low-risk foods are ambient-stable such as; bread, biscuits, cereals, crisps and cakes (not cream cakes). Such foods are unlikely to be implicated in food poisoning outbreaks.
Manufacturing	Made or produced in quantity e.g. supermarket bread.
Manufacturer	Those who produce, or manufacture, products for sale e.g. Walkers Crisps.
Market research	The process of finding out about or analysing the market for goods and services.
Microbiological contamination	Contamination from microorganisms that have not been removed or reduced in products that promote growth (can be spoilage or pathogenic bacteria).
Microorganisms	Microscopic living organisms e.g. bacteria, yeasts, moulds.
Monitoring	Observing or measuring a system to evaluate it.
Non toxic	Not poisonous.
Organic	Produced without the use of chemical fertilisers, pesticides etc.
Output	The result or outcome of a system.
Own label	Products sold under a retailer's own name e.g. Sainsbury's milk, made by another company.
Pasteurisation	A form of heat treatment that kills any pathogenic organisms e.g. process used with milk.
Pathogen	Disease producing organisms e.g. salmonella.
Physical contamination	Contamination that should not be present in foods e.g. part of a latex glove.
Pre-pack	Pre-packaged goods otherwise sold loose, e.g. fruit and vegetables.
Preservation	Ways of extending the shelf life of foods by controlling the temperature, pH or water content which inhibits the growth of micro-organisms or the action of enzymes.

Explanations of the key terms used within this unit, in the context of this unit





Key term	Explanation
Procurement	The sourcing and buying of raw materials, packaging and other resources.
Product development	Amending or creating a food product.
Product specification	The exact details of a product (specified) that needs to be followed in manufacturing.
Primary processing	The conversion of raw materials into food commodities e.g. milling of wheat grain into flour.
Process	What happens or takes place as information energy or materials pass through a system.
Process control	The process of measuring product performance against the manufacturing specification.
Product lines	A range of products e.g. Tesco BBQ range.
Production	The process of making or producing e.g. soup.
Quality	A standard that can be measured and that a product should meet e.g. a specific size, shape, texture or nutritional value.
Quality assurance	A system carried out throughout the manufacturing process to make sure products are meeting the required quality.
Quality control	The process of measuring product performance against the design specification.
Retail multiples	Large retailers with numerous outlets, e.g. Asda, Tesco.
Risk	The likelihood of a hazard.
Risk assessment	The process of analysing the possibility of risk and likely impact.
Scaled up	For volume production, the process of increasing the quantities of ingredients in a recipe or formulation.
Secondary processing	The conversion of food commodities into products e.g. flour into bread.
Segregation	Keeping apart, or separating, e.g. high and low risk ingredients to prevent cross-contamination.
Sensory	Relating to the senses of sight, smell, taste, touch.
Sensory evaluation	The scientific measurement of the qualities of a product e.g. appearance, aroma, texture, taste.
Shelf life	The length of time a product is expected to last under recommended storage conditions and still be safe and fit to eat.
Sourced	The place of origin that raw materials or ingredients were supplied from.
Storage	The condition in which foods are stored e.g. ambient, chilled or frozen.
System	A planned approach to performing a task to meet an identified need e.g. HACCP.
Traceability	The ability to verify history, location or process of a product.
Trialling	The process of trying out or putting something to the test.
Unit operation	A step, or stage, in the process of manufacturing a product e.g. mixing, heating.

MISCONCEPTIONS





Some common misconceptions and guidance on how they could be overcome		
What is the misconception?	How can this be overcome?	Resources which could help
<p>Many people think that healthy food is low-fat food - and vice versa - but this is actually not a valid equation</p>	<p>Firstly, many low fat foods are not actually all that healthy. Many ready-meals, yogurts and snacks for example, are advertised as low-fat, but that by no means makes them healthy if they are instead full of salt, additives and sugar. Activities in LO4 are designed to ensure that labelling is read and that nutritional values are considered. When compared to standard products a low fat product for example will show minimal difference in sugar content.</p>	<p>http://www.food.gov.uk/ http://www.chilledfood.org/ http://www.ift.org/food-technology.aspx http://www.ifst.org/food-science-technology-magazine http://www.foodanddrinktechnology.com/magazine/ http://www.excelpublishing.co.uk/services/magazines/food-science-technology</p>
<p>A low-fat label does not automatically signal a healthy snack, neither does an 'organic' or 'natural' one</p>	<p>Although organic foods may be healthier than non-organic versions of the same snack, being organic or natural does not exclude foods from being loaded with salt, sugar or saturated fats.</p>	<p>http://www.food.gov.uk/ http://www.chilledfood.org/ http://www.ift.org/food-technology.aspx http://www.ifst.org/food-science-technology-magazine http://www.foodanddrinktechnology.com/magazine/ http://www.excelpublishing.co.uk/services/magazines/food-science-technology</p>
<p>Many people use the phrases 'food allergy' and 'food intolerance' as though they were interchangeable, however this is not the case</p>	<p>Although many people believe they have food allergies, it is more likely they are suffering from food intolerance. While up to 45% of the UK population suffer from food intolerance according to Allergy UK, allergies are a lot rarer, affecting only one to two per cent of people. Also, while they are less common, the effects of food allergies are also a lot more severe since they involve the immune system, meaning that symptoms can even be life-threatening. In contrast, food intolerances mainly involve the digestive system - with sufferers having trouble digesting food - and symptoms, although uncomfortable and even painful, are never life-threatening.</p>	<p>http://www.food.gov.uk/ http://www.ift.org/food-technology.aspx http://www.ifst.org/food-science-technology-magazine</p>
<p>People believe you can tell whether food is safe by the look or smell however this isn't true</p>	<p>Potentially dangerous germs such as E. coli and salmonella won't change the appearance of food and it won't necessarily smell 'off'.</p>	<p>http://www.food.gov.uk/ http://www.amazon.co.uk/Supervising-Food-Safety-Level-3/dp/1907751777</p>
<p>Nearly 50% of people believe the 'use by date' is put on foods by retailers so you have to throw them out</p>	<p>The FSA explains that food can be safely eaten after its 'best before' date as this only shows how fresh long-life food is, rather than whether or not it is safe to eat. 'Use by' dates are a different story. Food should always be consumed before its 'use by' date and there is a risk of food poisoning after this date.</p>	<p>http://www.food.gov.uk/ http://www.amazon.co.uk/Supervising-Food-Safety-Level-3/dp/1907751777</p>

Some common misconceptions and guidance on how they could be overcome		
What is the misconception?	How can this be overcome?	Resources which could help
One in four people believe food poisoning is caused by the last thing they've eaten	Symptoms of food poisoning usually take one – three days to develop, but it can take as long as several weeks.	http://www.food.gov.uk/ http://www.amazon.co.uk/Supervising-Food-Safety-Level-3/dp/1907751777
The food and drink industry doesn't need people with high level skills	The food and drink sector is struggling to fill its technical and engineering roles due to a lack of understanding around opportunities in the sector. The sector employs 400,000 people and provides two and a half times the income to the UK economy compared to the automotive industry. The food and drink sector needs scientists, engineers and much more to support the UK industry that remains one of the best and safest in the world. The job opportunities and salaries are evident in any food manufacturing link vacancies section.	http://tastycareers.org.uk/map http://www.fdf.org.uk/ http://www.foodmanufacture.co.uk/ http://www.foodprocessing.com/





SUGGESTED ACTIVITIES

LO No:	1		
LO Title:	Understand the main features of food manufacturing operations		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
Identifying manufacturing sectors 	<p>Learners could identify different manufacturing sectors but completing an analysis of either food in retail multiple (external visit), looking on an online shopping link or by studying a pre printed sample shopping list. Tutors could guide learners to identify primary and secondary processing and key differences between each sector and whether they are labour intensive or more automated. Several examples for each sector with example manufacturers should be identified together with how products are distributed (imported and exported). A range of online resources can also be used for more independent research.</p> <p>http://www.chilledfood.org/ http://www.fdf.org.uk/ http://www.meatinfo.co.uk/ http://www.fruitnet.com/fpj http://www.foodmanufacture.co.uk/</p>	1 hour	Unit 19 LO1
Process flow development 	<p>Learners could investigate and draw and label a process flow for a named product including the stages in the manufacturing process. Examples are provided on http://tastycareers.org.uk/resources for tutors to select from. A range of outputs could be selected to enable the learner to appreciate different types of flow between the different manufacturing unit operations and how different components are inputted e.g. limited flow of fresh product compared to complex flow of a ready meal using pasteurisation. Tutors can ensure that this activity provides an understanding for learners as to how manufacturing differs from catering or bespoke production into a scaled up process. Critical Control Points (CCPs) should also be indicated on the chosen flow diagram. This can then allow discussion into HACCP as a management system to take place.</p>	1 hour	Unit 19 LO2
Functions within food manufacturing 	<p>Learners could investigate and record different functions within a food manufacturing environment. http://tastycareers.org.uk/map offers an interactive opportunity to investigate these roles and how they interactive with each other. Tutors could suggest exact roles for investigation and then develop the session into why and how they interact. Departments including Human Resources and product development can also be included for learners to appreciate the cost driven production aspect of manufacturing compared to the non value side of functions that do not contribute directly to profit.</p>	1 hour	
Food diary See Lesson Element Food diary 	<p>Learners could keep a food diary over a period of days as a summary of their food as a consumer, to analyse which sector of the food industry their product choices come from. Tutors could guide learners to identify storage conditions of products e.g. ambient, chilled or frozen and the risk (high or low) to food safety if these storage instructions are not followed. The Supervising Food safety book (http://www.amazon.co.uk/Supervising-Food-Safety-Level-3/dp/1907751777) provides helpful tables of pathogenic bacteria linked to the different food sectors.</p>	45 minutes (additional time for diary if records over a period of days)	



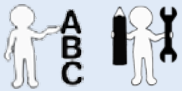

SUGGESTED ACTIVITIES

LO No:	2		
LO Title:	Understand the importance of food safety in food manufacture		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
Hand Hygiene activity 	<p>Learners could investigate the spread of bacteria through poor personal hygiene by carrying out a simple hand shaking activity using glue and glitter. Tutors could facilitate the glue and glitter application to the first learner, this learner will then shake the hand of the next learner and then follow down the line (glitter represents microorganisms and how they are spread from person to person/ surface to surface). The activity can then be repeated using Vaseline on hands before glue and glitter are applied; this demonstrates the usage of antibacterial hand gels in the food manufacturing sector. This activity is also useful for explaining how cross contamination takes place. Tutors may prefer to purchase a Glow Germ hand washing training kit see KS4 resources http://www.chilledfood.org/</p>	20 minutes (depending on group size)	Unit 6 LO2
Food alerts 	<p>Learners could develop their research skills by investigating food alerts published by the Food Standards Agency. http://www.food.gov.uk/enforcement/alerts. Tutors could use this resource to debate with learners what the nature of the alert has been, why is it a significant risk to food safety and how it might have happened? This activity can be extended if linked with LO2 by investigating a specific microorganism and its links to food poisoning, e.g. E Coli, campylobacter or salmonella. An extended activity can be supported by further reading. http://www.amazon.co.uk/Supervising-Food-Safety-Level-3/dp/1907751777</p>	1 hour (2 hours if extended)	Unit 18 LO3
IFST teaching materials 	<p>Learners could develop their knowledge of food safety by widening research skills into current food safety related issues. Conferences and guest speakers provide up to date information and options on food safety related issues. Tutors could show links provided by the Institute of Food and science Technology relevant to the topic being covered, the knowledge centre provides a variety of downloads and resources to allow individual or group research. http://www.ifst.org/knowledge-centre/event-highlights</p>	30 minutes minimum (dependant on section selected)	
Contamination activity See Lesson Element Contamination activity 	<p>Learners could investigate physical, chemical and microbiological contamination (spoilage microorganisms and pathogens) by using a simple images activity allowing learners to categorise the images into relevant sections. Learners could then identify potential control measures as part of a risk assessment, to reduce or eliminate the hazards and risk of further contamination as part of a food hygiene system. This activity also allows investigation into the process of quality assurance and quality control.</p>	20 minutes	Unit 18 LO1

SUGGESTED ACTIVITIES

LO No:	3		
LO Title:	Understand the importance of quality control in food manufacture		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
Sensory sampling of own label products See Lesson Element Sensory sampling of own label products 	Learners could build upon knowledge of product quality, brands and quality attributes by completing a sensory sampling activity of retail multiple own label products. Tutors could introduce blind testing of a range of 3 of more different types of product to present an opportunity to utilise sensory skills and to compare aesthetic information. Samples could include a value range product, a standard range product and a high value product. These can be from the same retail multiple or from across multiples. For example, Tesco Value range, Sainsbury's Basic range and Coop Truly Irresistible range. Small products can be chosen if space is limited e.g. Shortbread (Authentic Scottish Shortbread). Learners will record and calculate results of the group.	45 minutes	
Ingredients analysis 	Learners could develop an appreciation of raw materials linked to ingredients declaration on products by carrying out an ingredients analysis. Ingredients where raw materials can be separated easily are ideal e.g. pizza. The tutor should guide the learners in taking each component off separately, weighing it and comparing it to the declaration on label. A table of ingredients can be prepared prior to the weighing activity to utilise for weight findings. Where a declaration is made e.g. 40% meat, this can then be investigated against the weight of other ingredients.	45 minutes	
Triangle testing 	Learners could understand the different processes involved in sampling by conducting a blind sample of two different products e.g. organic verses non organic apples and a triangle test, where two products of one type are compared against another. It should be identified by tutors if products have been imported. Learners will be asked to use their aesthetic perceptions to comment on the flavour, texture, crispiness of the apple and whether they can identify the difference between organic or non-organic in any of these attributes.	20 minutes	
Perceptions check 	Learners could be asked to express their thoughts on what makes a quality product and what is quality. Key words can be used to distinguish these perceptions and a link to how the food industry drives quality standards to meet customer expectations can be used. Tutors could also include the role of retail multiples and how their marketing plans (including market research and feasibility studies) change to compete against each other. Perception of quality verses price, exclusivity, retailer (brand leaders) and personal preference can all be explored. Learners will be able to consider the original design brief and criteria that a manufacturer will have worked to.	20 minutes	

SUGGESTED ACTIVITIES

LO No:	4		
LO Title:	Be able to test product samples		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
Food Label Analysis 	<p>Learners could build upon knowledge of products, quality attributes and legal compliance by completing a label analysis activity of a retail multiple own label product or branded pre-packed product. Tutors could include a product with sufficient labelling information to allow an appreciation of food safety aspects e.g. cooking instructions, allergens information, nutritional information, source of product and storage instructions e.g. chilled or frozen. (or another method of preservation). This activity will also provide an appreciation of production lines and can introduce the concept of segregation where allergens have been identified. Traceability of product can also be discussed.</p> <p>Additional reading – http://www.excelpublishing.co.uk/services/magazines/food-science-technology http://www.foodmanufacture.co.uk/</p>	45 minutes	
Attribute testing of pizza (or other named product) 	<p>Learners could test product samples using a range of equipment to determine food safety compliance (temperature confirmation at end of cooking), shelf life confirmation (fridge thermometer to confirm storage conditions), specification determination (size) – use of ruler/callipers to provide size parameters of given ingredients. Tutors could guide learners to be able to provide a basic attribute sheet their findings. Aesthetic properties and sensory evaluation can also be tested if the product has been prepared following manufacturer instructions and food safety measures are in place.</p>	1 hour	
Shelf life activity 	<p>Learners could monitor the effects of shelf life/storage conditions as part of a trailing activity on a given product. Over a period of lessons learners, guided by tutors, could compare samples stored at different temperatures e.g. broccoli stored at ambient and chilled. Photographic evidence will assist in being able to analyse results of storage data. Tutors could guide learners to consider sensory aspects e.g. appearance, feel, smell and effects on quality of storage.</p>	20 minutes per session (assuming 3 weeks apart)	
Reduced fat/sugar testing 	<p>Learners could investigate their preferences of reduced fat and sugar concept products (or no fat/sugar) products in a comparison test. This testing allows learners to appreciate the effectiveness of artificial sugars and synthetic fats on products and how production methods may need to be evaluated to accommodate their use. Tutors could support this investigation by linking the activity to a label scan to establish what alternative ingredients have replaced animal/vegetable fats or cane/beet sugar.</p> <p>Additional reading on the role of fats and sugars – http://www.amazon.co.uk/Science-Technology-Foods-R-K-Proudlove/dp/1899527087 http://www.amazon.co.uk/Food-Science-Technology-Geoffrey-Campbell-Platt/dp/0632064218 http://www.amazon.co.uk/Camerons-Science-Nutrition-Edition-Publication/dp/0340809485</p>	30 minutes	



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