

Food & Nutrition 2025 v1.0

General senior syllabus

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Queensland Curriculum & Assessment Authority
PO Box 307 Spring Hill QLD 4004 Australia

Phone: (07) 3864 0299

Email: office@qcaa.qld.edu.au

Website: www.qcaa.qld.edu.au

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Queensland syllabuses for senior subjects

In Queensland, a syllabus for a senior subject is an official 'map' of a senior school subject. A syllabus's function is to support schools in delivering the Queensland Certificate of Education (QCE) system through high-quality and high-equity curriculum and assessment.

Syllabuses are based on design principles developed from independent international research about how excellence and equity are promoted in the documents teachers use to develop and enliven the curriculum.

Syllabuses for senior subjects build on student learning in the Prep to Year 10 Australian Curriculum and include General, General (Extension), Senior External Examination (SEE), Applied, Applied (Essential) and Short Course syllabuses.

More information about syllabuses for senior subjects is available at www.qcaa.qld.edu.au/senior/senior-subjects and in the 'Queensland curriculum' section of the *QCE and QCIA policy and procedures handbook*.

Teaching, learning and assessment resources will support the implementation of a syllabus for a senior subject. More information about professional resources for senior syllabuses is available on the QCAA website and via the QCAA Portal.

Course overview

Rationale

Technologies have been an integral part of society for as long as humans have had the desire to create solutions to improve their own and others' quality of life. Technologies have an impact on people and societies by transforming, restoring and sustaining the world in which we live.

Australia needs enterprising and innovative individuals with the ability to make discerning decisions related to the development, use and impact of technologies. When developing technologies, these individuals need to be able to work independently and collaboratively to solve complex, open-ended problems. Subjects in the Technologies learning area prepare students to be effective problem-solvers as they learn about and work with contemporary and emerging technologies.

Food & Nutrition is the study of food in the context of food science, nutrition and food technologies. Students explore the chemical and functional properties of nutrients to create food solutions that maintain the beneficial nutritive values. This knowledge is fundamental for continued development of a safe and sustainable food system that can produce high quality, nutritious solutions with an extended shelf life. The food system includes the sectors of production, processing, distribution, consumption, research and development. Waste management, sustainability and food protection are overarching principles that have an impact on all sectors of the food system. Students will actively engage in a food and nutrition problem-solving process to create food solutions that contribute positively to preferred personal, social, ethical, economic, environmental, legal, sustainable and technological futures.

Food & Nutrition is a developmental course of study. In Unit 1, students develop an understanding of the chemical and functional properties of vitamins, minerals and protein-based food, as well as sensory profiling, food safety, spoilage and preservation. In Unit 2, students explore consumer food drivers, sensory profiling, labelling and food safety, and the development of food formulations. In Unit 3, students develop knowledge about the chemical, functional and sensory properties of carbohydrate- and fat-based food, and food safety, food preservation techniques and spoilage. In Unit 4, students focus on the investigation of problems for nutrition consumer markets and develop solutions for these while improving safety, nutrition, transparency and accessibility, as well as considering the wider impacts and implications of solutions.

Using a problem-solving process in Food and Nutrition, students learn to apply their food science, nutrition and technologies knowledge to solve real-world food and nutrition problems. Students learn to explore complex, open-ended problems and develop food and nutrition solutions. They recognise and describe problems, determine solution success criteria, develop and communicate ideas and generate, evaluate and refine real-world-related solutions. Students justify their decision-making and acknowledge the societal, economic and environmental sustainability of their food and nutrition solutions. The problem-based learning framework in Food and Nutrition encourages students to become self-directed learners and develop beneficial collaboration and management skills.

Food & Nutrition is inclusive of students' needs, interests and aspirations. It challenges students to think about, respond to, and create solutions for contemporary problems in food and nutrition. Students will become enterprising individuals and make discerning decisions about the safe development and use of technologies in the local and global fields of food and nutrition.

In Food & Nutrition, students learn transferable 21st century skills that support their aspirations, including critical thinking, creative thinking, communication, collaboration and teamwork, personal and social skills, and information & communication technologies (ICT) skills. Students become adaptable and resilient through their problem-solving learning experiences. These skills enable students to innovate and collaborate with people in the fields of science, technology, engineering and health to create solutions to contemporary problems in food and nutrition.

Syllabus objectives

The syllabus objectives outline what students have the opportunity to learn.

1. Recognise and describe food and nutrition facts and principles.

When students recognise, they identify or recall characteristics of facts and principles related to food and nutrition problems. When describing, students give an account of the characteristics of food and nutrition facts and principles in a range of contexts.

2. Explain food and nutrition ideas and problems.

When students explain, they make an idea or problem clear by describing it in more detail and revealing relevant facts.

3. Analyse problems, information and data.

When students analyse, they dissect problems, information and data to ascertain and examine constituent parts and/or their relationships. They identify constraints, the relationships between them, and the reasonableness of information and data related to the problem.

4. Determine solution requirements and criteria.

When students determine solution requirements, they establish, conclude or ascertain the needs of food and nutrition stakeholders. They deduce success criteria, which will be used to evaluate the solution.

5. Synthesise information and data.

When students synthesise, they combine and integrate information and data from research and experiments into a whole in order to create new understanding. They combine primary experimental data about alternative ideas, and secondary data including food and nutrition information from research. When students develop ideas, they use new understandings to devise strategies and processes as alternative solutions to a food and nutrition problem. They choose a solution and elaborate, expand or enlarge their ideas in detail.

6. Generate solutions to provide data to determine the feasibility of the solution.

When students generate, they create a solution to provide data to determine the feasibility of that solution. A solution is the culmination of experimentation of at least three prototypes and includes generation of a refined solution.

7. Evaluate and refine ideas and solutions to make justified recommendations for enhancement.

When students evaluate, they appraise ideas and solutions by weighing up or assessing strengths and limitations against success criteria. When students refine ideas and solutions, they use data to make improvements relative to the criteria. When students make justified recommendations, they put forward a point of view or suggestion using supporting evidence to make modifications or enhancements.

8. Make decisions about and use mode-appropriate features, language and conventions for particular purposes and contexts.

When students make decisions about mode-appropriate features, language and conventions, they use written and visual features to express meaning for particular purposes in a range of contexts. Written features include language conventions, specific vocabulary and language attributes such as annotations, paragraphs and sentences. Visual features include photographs, graphs, sketches, drawings and diagrams. Students use referencing conventions to practise ethical scholarship.

Designing a course of study in Food & Nutrition

Syllabuses are designed for teachers to make professional decisions to tailor curriculum and assessment design and delivery to suit their school context and the goals, aspirations and abilities of their students within the parameters of Queensland's senior phase of learning.

The syllabus is used by teachers to develop curriculum for their school context. The term *course of study* describes the unique curriculum and assessment that students engage with in each school context. A course of study is the product of a series of decisions made by a school to select, organise and contextualise subject matter, integrate complementary and important learning, and create assessment tasks in accordance with syllabus specifications.

It is encouraged that, where possible, a course of study is designed such that teaching, learning and assessment activities are integrated and enlivened in an authentic setting.

Course structure

Food & Nutrition is a General senior syllabus. It contains four QCAA-developed units from which schools develop their course of study.

Each unit has been developed with a notional time of 55 hours of teaching and learning, including assessment.

Students should complete Unit 1 and Unit 2 before beginning Units 3 and 4. Units 3 and 4 are studied as a pair.

More information about the requirements for administering senior syllabuses is available in the 'Queensland curriculum' section of the [QCE and QCIA policy and procedures handbook](#).

Curriculum

Senior syllabuses set out only what is essential while being flexible so teachers can make curriculum decisions to suit their students, school context, resources and expertise.

Within the requirements set out in this syllabus and the [QCE and QCIA policy and procedures handbook](#), schools have autonomy to decide:

- how and when subject matter is delivered
- how, when and why learning experiences are developed, and the context in which learning occurs
- how opportunities are provided in the course of study for explicit and integrated teaching and learning of complementary skills.

These decisions allow teachers to develop a course of study that is rich, engaging and relevant for their students.

Assessment

Senior syllabuses set out only what is essential while being flexible so teachers can make assessment decisions to suit their students, school context, resources and expertise.

General senior syllabuses contain assessment specifications and conditions for the assessment instruments that must be implemented with Units 3 and 4. These specifications and conditions ensure comparability, equity and validity in assessment.

Within the requirements set out in this syllabus and the [QCE and QCIA policy and procedures handbook](#), schools have autonomy to decide:

- specific assessment task details
- assessment contexts to suit available resources
- how the assessment task will be integrated with teaching and learning activities
- how authentic the task will be.

In Unit 1 and Unit 2, schools:

- develop at least two but no more than four assessments
- complete at least one assessment for each unit
- ensure that each unit objective is assessed at least once.

In Units 3 and 4, schools develop three assessments using the assessment specifications and conditions provided in the syllabus.

More information about assessment in senior syllabuses is available in 'The assessment system' section of the [QCE and QCIA policy and procedures handbook](#).

Subject matter

Each unit contains a unit description, unit objectives and subject matter. Subject matter is the body of information, mental procedures and psychomotor procedures (see Marzano & Kendall 2007, 2008) that are necessary for students' learning and engagement with the subject. Subject matter itself is not the specification of learning experiences but provides the basis for the design of student learning experiences.

Subject matter has a direct relationship with the unit objectives and provides statements of learning that have been constructed in a similar way to objectives.

Aboriginal perspectives and Torres Strait Islander perspectives

The QCAA is committed to reconciliation. As part of its commitment, the QCAA affirms that:

- Aboriginal peoples and Torres Strait Islander peoples are the first Australians, and have the oldest living cultures in human history
- Aboriginal peoples and Torres Strait Islander peoples have strong cultural traditions and speak diverse languages and dialects, other than Standard Australian English
- teaching and learning in Queensland schools should provide opportunities for students to deepen their knowledge of Australia by engaging with the perspectives of Aboriginal peoples and Torres Strait Islander peoples
- positive outcomes for Aboriginal students and Torres Strait Islander students are supported by successfully embedding Aboriginal perspectives and Torres Strait Islander perspectives across planning, teaching and assessing student achievement.

Guidelines about Aboriginal perspectives and Torres Strait Islander perspectives and resources for teaching are available at www.qcaa.qld.edu.au/k-12-policies/aboriginal-torres-strait-islander-perspectives.

Where appropriate, Aboriginal perspectives and Torres Strait Islander perspectives have been embedded in the subject matter.

Complementary skills

Opportunities for the development of complementary skills have been embedded throughout subject matter. These skills, which overlap and interact with syllabus subject matter, are derived from current education, industry and community expectations and encompass the knowledge, skills, capabilities, behaviours and dispositions that will help students live and work successfully in the 21st century.

These complementary skills are:

- literacy — the knowledge, skills, behaviours and dispositions about language and texts essential for understanding and conveying English language content
- numeracy — the knowledge, skills, behaviours and dispositions that students need to use mathematics in a wide range of situations, to recognise and understand the role of mathematics in the world, and to develop the dispositions and capacities to use mathematical knowledge and skills purposefully
- 21st century skills — the attributes and skills students need to prepare them for higher education, work, and engagement in a complex and rapidly changing world. These skills include critical thinking, creative thinking, communication, collaboration and teamwork, personal and social skills, and digital literacy. The explanations of associated skills are available at www.qcaa.qld.edu.au/senior/senior-subjects/general-subjects/21st-century-skills.

It is expected that aspects of literacy, numeracy and 21st century skills will be developed by engaging in the learning outlined in this syllabus. Teachers may choose to create additional explicit and intentional opportunities for the development of these skills as they design the course of study.

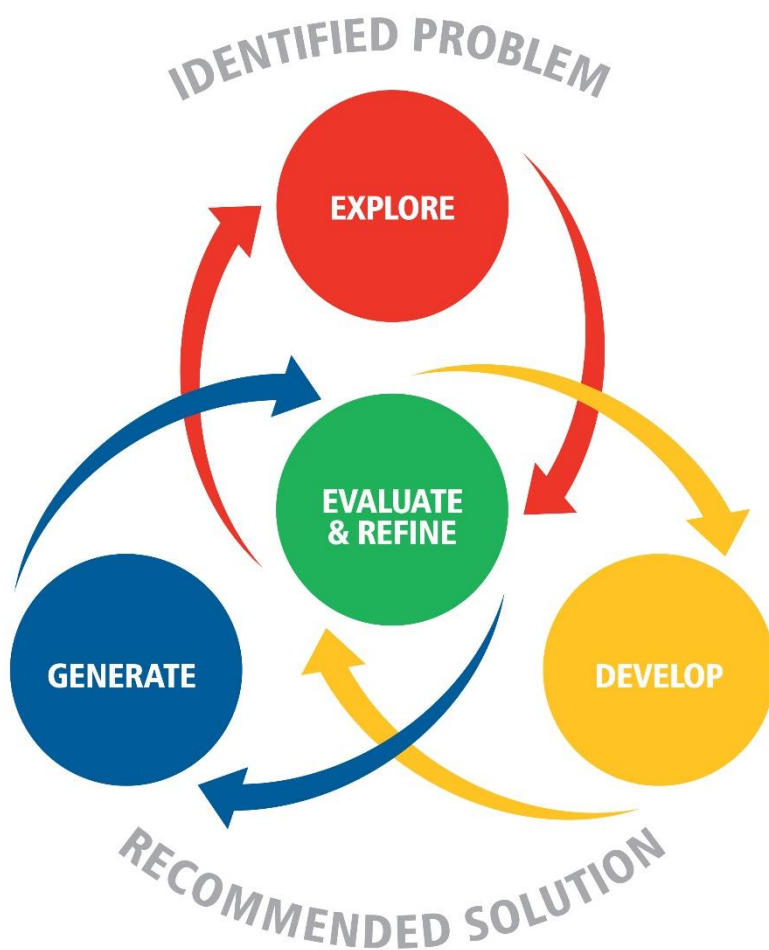
Additional subject-specific information

Additional subject-specific information has been included to support and inform the development of a course of study.

Procedural knowledge

This procedural knowledge must be integrated into the subject matter and assessment of all units. Each of four units are structured to provide students with the opportunity to apply the problem-solving process in Food & Nutrition (see Figure 1). Each unit includes a particular context/s with associated knowledge and skills.

Figure 1: Problem-solving process in Food & Nutrition



The problem-solving process in Food & Nutrition is iterative and includes the four phases of Explore, Develop, Generate and Evaluate and refine. Evaluate and refine is a critical phase as it involves making decisions about where and how the process will proceed relative to the other phases. The decisions students make about moving within and between the various phases reflects the iterative nature of the process.

Explore phase

The explore phase involves students investigating needs and constraints, or requirements to analyse and understand a food and nutrition problem and its relationship to existing solutions.

To explore the problem, students:

- recognise and describe facts and principles related to food and nutrition problems
- explain ideas and problems in a range of food and nutrition contexts
- analyse the needs of relevant stakeholders to identify constraints of the problem
- develop a brief that determines the solution requirements, including
 - stakeholders' needs
 - principles of food science and food safety and legislation related to the problem characteristics and constraints of the problem
- determine success criteria against which to evaluate ideas and the solution. Success criteria address
 - solution requirements from the brief
 - impacts and implications of the solution — personal, social, ethical, economic, environmental, legal, sustainable and technological.

Develop phase

The develop phase involves students creating new understanding to determine possible solutions. Students evaluate ideas and alternative solutions against success criteria and data.

To develop ideas, students:

- research required knowledge and processes from primary sources and secondary sources by
 - conducting interviews with relevant stakeholders
 - experimenting with chemical and functional properties
 - researching the latest trends, raw materials, food components and processing techniques
- synthesise information and data to develop ideas for alternative solutions
- explain using annotations, paragraphs, images and sentences to describe in detail the development of ideas using relevant factual information
- evaluate idea development using solution success criteria
- determine which solution best meets the brief.

Generate phase

The generate phase involves students producing prototypes, that when tested, provide data to determine the feasibility of the food and nutrition solution.

To generate solutions, students:

- create a solution, such as a
 - devised set of experiments to demonstrate a food science principle or process
 - food development project prototype to test the feasibility of the generated solution and record data in graphical or tabular form.

Evaluate and refine phase

The evaluate and refine phase involves students appraising ideas and solutions against success criteria and data to make modifications and improvements. Evaluation occurs throughout each phase of the problem-solving process to refine ideas and possible solutions in response to success criteria and data.

To evaluate and refine, students:

- use success criteria and generate data to make judgments about the feasibility of the solution
- refine ideas and the proposed solution to match with criteria
- make justified recommendations about the solution for future modifications or enhancements

Reporting

General information about determining and reporting results for senior syllabuses is provided in the 'Determining and reporting results' section of the [QCE and QCIA policy and procedures handbook](#).

Reporting standards

Reporting standards are summary statements that describe typical performance at each of the five levels (A–E).

| |
|--|
| A |
| <p>The student, in a range of contexts, demonstrates accurate and discriminating recognition and discerning description of food and nutrition facts and principles; discerning explanation of food and nutrition ideas and problems.</p> <p>The student demonstrates insightful analysis of relevant problems, information and data related to food and nutrition; astute determination of solution requirements and evaluation criteria for food and nutrition problems.</p> <p>The student demonstrates coherent and logical synthesis of information and data to develop ideas for solutions; purposeful generation of solutions to provide valid data to determine the feasibility of solutions; critical evaluation and discerning refinement of solutions to make astute recommendations for enhancement; discerning decision-making about, and fluent use of, mode-appropriate features, language and conventions for particular purposes and contexts.</p> |
| B |
| <p>The student, in a range of contexts, demonstrates accurate recognition and effective description of food and nutrition facts and principles; effective explanation of food and nutrition ideas and problems.</p> <p>The student demonstrates considered analysis of relevant problems, information and data related to food and nutrition; logical determination of solution requirements and evaluation criteria for food and nutrition problems.</p> <p>The student demonstrates logical synthesis of information and valid data to develop ideas for solutions; effective generation of solutions to provide data to determine the feasibility of solutions; reasoned evaluation and effective refinement of solutions to make effective recommendations for enhancement; demonstrates effective decision-making about, and proficient use of, mode-appropriate features, language and conventions for particular purposes and contexts.</p> |
| C |
| <p>The student, in a range of contexts, demonstrates appropriate recognition and description of food and nutrition facts and principles; appropriate explanation of food and nutrition ideas and problems.</p> <p>The student demonstrates appropriate analysis of problems, information and data related to food and nutrition; reasonable determination of some solution requirements and evaluation criteria for food and nutrition problems.</p> <p>The student demonstrates simple synthesis of information and relevant data to develop ideas for solutions; adequate generation of solutions to provide data to determine the feasibility of solutions; feasible evaluation and adequate refinement of solutions to make fundamental recommendations for enhancement; appropriate decision-making about, and use of, mode-appropriate features, language and conventions for particular purposes and contexts.</p> |

D

The student, in a range of contexts, demonstrates variable recognition and superficial description of food and nutrition facts and principles; superficial explanation of food and nutrition ideas and problems.

The student demonstrates superficial analysis of problems and information or data related to food and nutrition; vague determination of some solution requirements and evaluation criteria for food and nutrition problems.

The student demonstrates rudimentary synthesis of information or data to develop partial ideas for solutions; partial generation of solutions to provide elements of data to determine the feasibility of solutions; superficial evaluation and refinement of ideas or solutions to make elementary recommendations; variable decision-making about, and inconsistent use of, mode-appropriate features, language and conventions for particular purposes and contexts.

E

The student, in a range of contexts, demonstrates recognition of food and nutrition facts and principles and explains some ideas.

The student demonstrates the making of statements about a problem or information related to food and nutrition; identification of a criterion for food and nutrition problems.

The student demonstrates unclear combinations of ideas about solutions; generation of elements of solutions; identification of a change to an idea or solution; unclear or fragmented use of mode-appropriate features, language and conventions.

Determining and reporting results

Unit 1 and Unit 2

Schools make judgments on individual assessment instruments using a method determined by the school. They may use the reporting standards or develop an instrument-specific marking guide (ISMG). Marks are not required for determining a unit result for reporting to the QCAA.

The unit assessment program comprises the assessment instrument/s designed by the school to allow the students to demonstrate the unit objectives. The unit judgment of A–E is made using reporting standards.

Schools report student results for Unit 1 and Unit 2 to the QCAA as satisfactory (S) or unsatisfactory (U). Where appropriate, schools may also report a not rated (NR).

Units 3 and 4

Schools mark each of the three internal assessment instruments implemented in Units 3 and 4 using ISMGs.

Schools report a provisional mark by criterion to the QCAA for each internal assessment.

Once confirmed by the QCAA, these results will be combined with the result of the external assessment developed and marked by the QCAA.

The QCAA uses these results to determine each student's subject result as a mark out of 100 and as an A–E.

Units

Unit 1: Food science of vitamins, minerals and protein

In this unit, students explore sectors of the food system and the nutrients that make up our food. They explore fundamentals of food science through practical investigation of the nutritional and scientific properties of vitamins, minerals and protein in foods. Students use the Food & Nutrition problem-solving process to build knowledge and develop and test ideas using a range of experimental techniques to create solutions. Students solve food-based problems for consumers by defining and analysing the problem, developing ideas, and generating and evaluating a solution.

In Topic 1, students identify and understand relevant sectors of the food system and how food is developed, produced, processed, transported, stored and distributed. They become aware of the nutrients found in food.

In Topic 2, students study vitamins and minerals and their functions in the body, sources and recommended values to support health. They explore, through experimentation, how processing and preservation techniques affect the bioavailability of vitamins and minerals. Students are introduced to descriptive sensory profiling methods and properties that determine consumer acceptance of foods.

In Topic 3, students study the functions of protein in the body, sources and recommended values to support health. They have the opportunity to discover, through experimentation, how protein-based food interacts with temperature and physical manipulation to produce nutritional food products.

Unit objectives

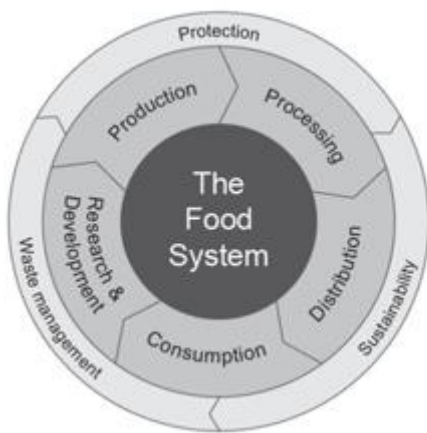
1. Recognise and describe facts and principles related to the nutritional, chemical, functional and sensory properties of vitamins, minerals and protein-based food.
2. Explain food science ideas and problems related to vitamins, minerals and protein-based food.
3. Analyse problems, information and data related to the properties and processing of vitamins, minerals and protein-based food.
4. Determine solution requirements and success criteria for vitamin, mineral and protein-based food problems.
5. Synthesise information and data for vitamin, mineral and protein-based food solutions.
6. Generate vitamin, mineral or protein-based food solutions to provide data to determine the feasibility of the solution.
7. Evaluate and refine ideas and solutions to make justified recommendations for modification or enhancement of vitamin, mineral and protein-based food solutions.
8. Make decisions about and use mode-appropriate features, language and conventions for particular purposes and food and nutrition contexts.

Subject matter

Topic 1: Introduction to the food system

- Recognise and describe the sectors of the food system, including
 - production
 - processing
 - distribution
 - consumption
 - research and development, e.g. a component of innovation, developing new products, or applied research in scientific or technological fields that facilitate future product development.

Figure 2: The food system



- Recognise and define the principles that affect all sectors of the food system, including
 - sustainability
 - waste management
 - protection, which involves protecting the food supply from contamination by food-borne illness and other foreign materials or chemicals during production, processing, distribution and storage.
- Explain that food is a chemically complex mixture of substances that contains nutrients, including
 - macronutrients
 - protein
 - carbohydrate
 - fat
 - water
 - fibre
 - micronutrients
 - fat-soluble vitamins A, D, E and K
 - water-soluble vitamins B1 (thiamine), B2 (riboflavin), B3 (niacin) and C
 - minerals calcium, sodium and iron.

Topic 2: Vitamins and minerals

- Comprehend and use the problem-solving process in Food & Nutrition to develop a food solution to either a vitamin-based or mineral-based problem.
- Describe relevant facts and principles about vitamins and minerals, including
 - the nutritional functions of vitamins and minerals in the body
 - nutrient reference value (NRV) of vitamins and minerals in the diet
 - food sources of vitamins and minerals.
- Recognise the health impacts of under- and over-consumption of vitamins and mineral-based food.
- Understand the purpose of different food models used to guide consumer choice regarding vitamin and mineral-based foods to maintain health, e.g. the Australian Guide to Healthy Eating and the Smart Choices/Traffic Light System.
- Examine vitamins and minerals, including recognising that foods rich in vitamins and minerals can be consumed raw (e.g. fruits and vegetables) or after processing and/or cooking, e.g. meat, dairy and grains.
- Compare the nutritive value, sensory properties and shelf life of food sources, e.g. fresh, frozen, dehydrated and canned vegetables or fruit.
- Examine vitamin- and mineral-rich foods, including explaining
 - that processing and cooking improves the bioavailability of many nutrients and can deplete some levels of vitamins and minerals
 - the distribution pathways required to process foods in ways that extend shelf life
 - that extending food shelf life, using correct storage methods and repurposing offcuts, by-products or waste fruit and vegetables, can assist with sustainability, thus reducing waste
 - the reasons for and benefits of food processing to consumers, including convenience, cost, access to nutrients and minimisation of seasonality and pathogen growth cycles
 - that some food sources, including fruit and vegetables, are semi-perishable and, depending on climate, may require refrigeration
 - that processed foods are non-perishable (e.g. canned or dried) and require only shelf storage until opened.
- Recognise and describe the physical properties of food that determine consumer acceptance of raw and processed foods, including
 - appearance, such as shape, size, weight, colour
 - taste, such as sour, salty, bitter, sweet, umami
 - texture from mouthfeel
 - aroma and flavour from sensations perceived in mouth, throat and nose.
- Analyse the impact of the physical properties of food, such as shape and appearance, on retail policy, consumer choice and food wastage.
- Research and develop ideas and strategies to solve the problem of using, rather than wasting, fruit and vegetables that do not meet quality assurance standards, e.g. repurposing aesthetically imperfect food (e.g. vegetable sticks, juices) or animal feed.

- Investigate descriptive sensory profiling through experimentation on vitamin- and mineral-rich foods, including
 - describing descriptive sensory profiling, which is used to determine whether a specific consumer group likes or prefers a particular product, including the
 - rating or likeability test, where panellists taste a sample and score it on a nine-point hedonic scale from 'dislike extremely' to 'like extremely'
 - lexicons, which provide a tool for communication within the panel and provide a basis for understanding the differences among products in a category, drive the design of consumer research questionnaires and provide industry confidence
 - analysing a rating or likeability test, including
 - developing the lexicon for sensory profiling of different versions of fruit or vegetable foods
 - experimenting and profiling a range of different fruit or vegetable foods to understand and explain preservation processes and compare the characteristics, e.g. application of cold, e.g. by chilling, freezing; freeze-drying; application of heat, e.g. by blanching, boiling, or braising; evaporation; pasteurisation; canning/bottling; ultra-high temperature (UHT); dehydration, e.g. dried fruit or vegetables; change of pH, e.g. through the addition of acid or alkali, such as pickling; additives, e.g. salt, antioxidants or sugar, such as salt-cured lemons or jam
 - investigating and explaining the effects of cooking methods on the retention of vitamins and minerals and the sensory properties of food, including moist heat cooking methods, e.g. stewing and dry heat cooking methods e.g. grilling and roasting
 - recording and analysing experiment results and drawing conclusions about the preferred sensory profiling for different fruit or vegetable foods
- Analyse information and data to determine the most appropriate method of food production to retain maximum vitamin and mineral quality in the food source.
- Research the development of innovative vitamin and mineral food sources, e.g. golden rice, genetically modified bananas to determine the health implications.

Topic 3: Protein

- Comprehend and use the problem-solving process in Food & Nutrition to develop a food solution to a protein-based food problem.
- Describe relevant facts and principles about protein, including
 - the nutritional functions of protein in the body
 - nutrient reference value (NRV) of protein in the diet
 - food sources of protein.
- Recognise the health impacts of under- and over-consumption of protein-based food.
- Understand the purpose of different food models used to guide consumer choice regarding protein-based foods to maintain health, e.g. the Australian Guide to Healthy Eating and the Smart Choices/Traffic Light System.
- Examine protein-based food, including
 - recognising that food sources of protein are both animal-based (meat and dairy) and plant-based (legumes, nuts and grains)

- explaining that proteins are comprised of amino acids
- recognising that proteins have functional properties, i.e. a range of properties that may result in different functions in food formulations, including elasticity
- explaining the cooking and processing techniques used to improve the palatability of protein-based foods, e.g.
 - canning
 - dehydration
 - change of pH through the addition of acid and alkali
 - additives, e.g. salt, antioxidants
 - physical manipulation, e.g. tenderisation, aeration
 - application of heat, e.g. grilling, roasting, poaching, braising and frying
- comparing the nutritive value, sensory properties and shelf life of fresh, frozen, dehydrated and canned meat
- experimenting with and analysing the chemical and sensory properties and food structure of protein-based food sources, including
 - aeration
 - denaturation by foam formation, e.g. meringues, using egg whites as an animal protein source and aquafaba as a plant protein source
 - the Maillard reaction
 - coagulation, e.g. use of acids, e.g. coagulating casein from milk using an acid to formulate cottage cheese, or coagulating casein from milk using lemon juice to make ricotta; use of enzymes, e.g. coagulating casein from milk using rennin as an enzyme to make junket; use of salt, e.g. coagulating soy protein from soy milk using magnesium sulphate to make tofu; use of heat, including raw eggs being manipulated then cooked as part of a formulation, e.g. meringue, custard, frittata and quiche formulations
- comparing the sensory properties of food science experiments including appearance, taste, texture, flavour and aroma
- synthesising primary data from experiments to develop ideas about the formulation of a protein-based food solution
- analysing the information and data from experimentation to explain the difference between denaturation and coagulation
- researching the development of innovative protein-based food products, e.g. synthetic meat, new plant-based products or ultra-high protein soybeans
- investigating methods of repurposing and waste management of protein-based food products, including
 - secondary meat products, e.g. mince; value-added products, e.g. flavoured sausages, pies and smallgoods; gelatine; animal feed; and fertilisers, e.g. bone meal
 - secondary milk products, e.g. yoghurt and probiotic drinks, whey protein-based products
- recognising and explaining how protein-based foods deteriorate at different rates and explaining how food composition influences this process
- explaining that most protein-based foods are perishable and require refrigeration or appropriate storage, depending on processing, to maintain shelf life.

Unit 2: Food drivers and emerging trends

In Unit 2, students explore the factors that determine what food solutions will be developed and made ready for marketing and consumption. These factors include consumer drivers and quality control standards, including food safety and labelling legislation. Students use the Food & Nutrition problem-solving process to build knowledge and skills that they can use to develop ideas related to consumer food drivers, sensory profiling and labelling legislation. Students will solve problems for consumer markets and food safety by defining and analysing the problem, developing ideas and generating and evaluating a solution.

In Topic 1, students evaluate traditional consumer drivers and their impact on the development of alternative food solutions to fulfil the future food demands of consumers.

In Topic 2, students revise sensory profiling and analyse the impact of physical properties on consumer choice.

In Topic 3, students analyse current food safety and labelling legislation and its relevance to consumer rights and the need for transparency in the food industry.

In Topic 4, students investigate food formulations for consumer markets.

Unit objectives

1. Recognise and describe facts and principles related to consumer demand, labelling and food safety.
2. Explain ideas and problems related to current and emerging consumer food markets.
3. Analyse problems, information and data related to current and emerging consumer food markets and food safety problems.
4. Determine solution requirements and success criteria for emerging consumer market and food safety problems.
5. Synthesise information and data to develop ideas for solutions related to emerging consumer market and food safety problems.
6. Generate consumer market and food safety food solutions to provide data to determine the feasibility of the solution.
7. Evaluate and refine ideas and solutions to make justified recommendations for modification or enhancement of consumer market and food safety food solutions.
8. Make decisions about and use mode-appropriate features, language and conventions for particular purposes and food and nutrition contexts.

Subject matter

Topic 1: Consumer food drivers

- Comprehend and use the problem-solving process in Food & Nutrition to solve consumer market and food safety problems.
- Recognise that all sectors of the food system are influenced by consumer demand.
- Explain the term *consumer demand*.
- Explain how consumers influence the range and development of foods within the food market.
- Analyse the impact of consumer-driven market trends on the range and development of foods.
- Investigate how consumer food drivers influence consumer purchasing decisions about food.
- Investigate consumer food drivers, including
 - convenience, including ease of consumption, storage, opening, preparation, accessibility and time-saving characteristics
 - budget, including the amount of money consumers are prepared to pay for quality, nutritious food products
 - perceived quality, including price versus quantity, nutritional properties, freshness and sensory properties of appearance, taste, texture, flavour and aroma
 - ethics and/or culture, e.g. cultural sensitivity, sustainability, organic production and food waste, animal welfare, genetically modified foods and fair-trade practices.
- Investigate and analyse consumer drivers and their impact on the development, safety and ethics of alternative food products to fulfil consumers' future food requirements, e.g.
 - genetically modified foods, including transparency of industry strategies
 - organic food compared to intensively farmed food
 - fortification and functional foods, including classifications and labelling, benefits of added or removed ingredients
 - entomophagy
 - synthetic food, including developments in food processing, e.g. 3D printing of foods
 - bush food sources.
- Investigate, identify and analyse consumer purchasing trends using primary and/or secondary data collection methods.
- Analyse information and data related to consumer drivers to identify needs or opportunities in food markets regarding food consumption.
- Investigate the terms 'food sustainability' and 'ethical practices' and how they relate to consumer decisions regarding food consumption.

Topic 2: Sensory profiling

- Recall that sensory profiling is used to
 - evaluate a range of existing food products
 - check that a final product meets its original brief
 - analyse a food prototype for improvements
 - gauge consumer response to a product.
- Recall and describe the physical properties of food that determine consumer acceptance of raw and processed foods, including
 - appearance, such as shape, size, weight, colour
 - taste, such as sour, salty, bitter, sweet, umami
 - texture from mouthfeel
 - aroma and flavour from sensations perceived in mouth, throat and nose.
- Recognise and describe methods of sensory profiling, such as
 - descriptive sensory profiling, which is used to determine whether a specific consumer group likes or prefers a particular product, e.g. the
 - triangle test, which is a discriminative method with many uses in sensory science, including gauging whether an overall difference is present between two products, selecting qualified panellists for a particular test and determining whether shifts in processing or ingredients have significantly changed a product
 - duo tri — comparing two products with a control to determine which is the same as the control
 - product profile — recording the intensity of sensory attributes using a lexicon, e.g. spiciness, sweetness
 - lexicons, which provide a tool for communication within the panel and provide a basis for understanding the differences among products in a category, drive the design of consumer research questionnaires and provide industry confidence that a product is within a brief.
- Analyse sensory profiling methods, through experimentation on various foods, to assess customer perception, including
 - recording and analysing experiment results and drawing conclusions about the preferred sensory profiling tests for different foods.

Topic 3: Food safety and labelling

- Determine how the biological, chemical and physical changes that occur in foods after harvesting can lead to deterioration.
- Summarise the differences between non-perishable, semi-perishable and perishable foods.
- Explain that the factors that cause food spoilage in food are biological, chemical and physical changes, and spoilage can occur during processing, or after production, through storage and handling, such as
 - biological changes caused by bacteria, yeast and moulds, such as spore development
 - chemical changes of oxidation and odour development as a result of enzymatic reactions
 - physical changes, e.g. evaporation, drip loss, separation of tissues, discolouration and wilting.

- Explain how food safety programs protect consumers, including hazard analysis and critical control points (HACCP).
- Explain critical control points (CCPs) relating to food safety and potential sources of contamination, including
 - biological hazards, e.g. pathogenic microorganisms, insects, animals
 - physical hazards, e.g. foreign objects such as plastics, glass, soil, heavy metals and pesticides
 - chemical hazards, e.g. naturally occurring chemical toxins in foods such as ciguatera, solanine, lectin, alkaloids, and triamines.
- Explain the purpose of Food Standards Australia New Zealand (FSANZ).
- Analyse consumer rights and transparency issues related to food labelling legislation (FSANZ), including
 - genetically modified foods developed in Australia and other countries, and their impacts on consumers and the environment
 - country of origin labelling
 - health claims labelling
 - health star rating system
 - novel sources of food, e.g. consumption of insects, dried marine micro-algae
 - food additives, including preservatives
 - ingredients and percentage labelling — quantity of base ingredients
 - use and storage instructions — accuracy and effectiveness
 - ethics surrounding third-party certifications, e.g.
 - Heart Foundation
 - celebrity endorsements
 - RSPCA.

Topic 4: Food formulation for consumers

- Explain how combining ingredients in appropriate ratios or structures, according to a formula, is known as food formulation.
- Recognise and describe how consumer food drivers influence food production for the
 - ethical food consumer, e.g. guaranteeing the authenticity of organic, sustainable, cruelty-free and fair-trade products
 - time-poor food consumer, e.g. the increasing availability of convenience food, ready-made food and delivered products
 - gourmet food consumer, e.g. the development of sophisticated, cultural, ethical, novel and contemporary food products
 - solo food consumer, e.g. the increasing need for single-serve food products
 - cultural food consumer, e.g. consumption of Australian native foods.
- Investigate the range of food products available for the above consumers.
- Analyse research data and other information about consumer food drivers (listed above) to determine their relevance and application to current food markets.

Unit 3: Food science of carbohydrate and fat

In Unit 3, students study the fundamentals of food science through practical investigation of the nutritional, scientific and sensory properties of carbohydrate- and fat-based food products. Students use the Food & Nutrition problem-solving process to build knowledge and skills that they can use to develop and test ideas, using a range of experimental techniques to create solutions. Students will solve carbohydrate- or fat-based food problems by defining and analysing the problem, developing ideas and generating and evaluating a solution.

In Topic 1, students study the functions and nutritional value of carbohydrate. They investigate how carbohydrate's chemical and functional properties respond to temperature and manipulation to create food products. Students also study food safety, preservation and spoilage-prevention techniques for carbohydrate-based foods.

In Topic 2, students study the functions and nutritional value of fat. They investigate how the chemical and functional properties of fats respond to temperature and manipulation to create food products. Students study food safety, preservation and spoilage-prevention techniques for fat-based food products and experiment with formulation processes.

Unit objectives

1. Recognise and describe facts and principles related to nutritional, chemical, functional and sensory properties of carbohydrate- and fat-based food.
2. Explain food science ideas and problems related to carbohydrate- and fat-based food.
3. Analyse problems, information and data related to carbohydrate- and fat-based food.
4. Determine solution requirements and success criteria for carbohydrate- and fat-based food problems.
5. Synthesise information and data for carbohydrate- and fat-based food solutions.
6. Generate carbohydrate- and fat-based food solutions to provide data to determine the feasibility of the solution.
7. Evaluate and refine ideas and solutions to make justified recommendations for modification or enhancement to carbohydrate- and fat-based food solutions.
8. Make decisions about and use mode-appropriate features, language and conventions for particular purposes and contexts.

Subject matter

Topic 1: Carbohydrate

- Use the problem-solving process in Food & Nutrition to solve carbohydrate-based food problems.
- Recall how food is a chemically complex mixture of substances that contains nutrients, including
 - protein
 - carbohydrate
 - fat
 - minerals calcium, sodium, iron
 - fat-soluble vitamins A, D, E and K
 - water-soluble vitamins B1 (thiamine), B2 (riboflavin), B3 (niacin) and C
 - water.
- Explain relevant facts related to carbohydrate
 - the functions of carbohydrate in the body, including
 - providing heat and energy
 - regulating body processes
 - regulating the use of carbohydrate-based food
 - the classifications and nutritional value of carbohydrate
 - monosaccharide
 - disaccharide
 - oligosaccharide
 - polysaccharide
 - nutrient reference value (NRV) of carbohydrate in the diet.
- Recognise the impacts of over- and under-consumption of carbohydrate-based food on health.
- Examine sectors of the food system using carbohydrate-based food, including
 - explaining that the production of carbohydrate-based food involves the planting, growing and harvesting of plant food sources
 - recognising that some carbohydrate-based food sources can be consumed raw, e.g. most fruits and vegetables and some after processing, e.g. grains
 - explaining the distribution pathways required to process foods in ways that extend shelf life
 - explaining the reasons for and benefits of food processing to consumers, including convenience, cost, access to nutrients and minimisation of seasonality and pathogen growth cycles
 - investigating the development of carbohydrate-based foods including
 - resistant starch e.g. green banana flour, alternative grain flours e.g. oat flour, buckwheat flour, or natural sweeteners in baking comparing the sensory properties
 - alternative uses for carbohydrates, e.g. edible cutlery made of millet
 - alternative methods of waste management for carbohydrate-based food waste, including secondary products resulting from, and by-products of, processing, e.g. using spent grains.

- Use food science experiments, to identify how food components interact with the manipulation of temperature and chemical and functional properties of carbohydrate-based food to draw conclusions about use in food, including
 - gelatinisation, by explaining that gelatinisation occurs when liquids containing starch are heated; explaining that gelatinisation has three stages and is affected by the type of starch, temperature, and the quantity of tenderiser and type of acid used; experimenting with different types of starch to identify how they react in the gelatinisation process, e.g. wheat flour, cornflour, potato starch and tapioca; recording and analysing results of experiments and drawing conclusions to determine which products would suit different formulations, comparing characteristics of appearance, taste, texture, flavour and aroma
 - crystallisation and nucleation, by explaining crystallisation as a processing technique that is used to separate a solid dissolved in a solution from the liquid; explaining that nucleation is the formation of a crystal from a solution, a liquid or a vapour; demonstrating and comprehending crystallisation and nucleation, including super-saturated solutions, using sugar and water
 - caramelisation, by recognising that caramelisation is a type of non-enzymatic browning; explaining that caramelisation is the oxidation of sugar
 - dextrinisation, by explaining that dextrinisation is the process involving the browning of starch foods when they are subjected to dry heat and is defined as the breakdown of starch into dextrans or disaccharides; experimenting with carbohydrate-based food to demonstrate and comprehend dextrinisation, e.g. dry heat application to starch-based end-products
 - gelification, by defining gelification as the process of converting liquid substances into a solid gelatinous form with the help of a gelling agent, e.g. agar-agar, gelatine, carrageenan, gellan gum, pectin and methylcellulose carbohydrate; experimenting using gelling agents, e.g. using agar-agar to make soup noodles or cream cheese noodles
 - leavening, by describing leavening as the expansion of dough or batter or baked products resulting in rising; explaining the purpose of leavening agents to improve the gas bubbles and rising of dough; recognising and explaining the effects of three different types of leavening agents, including biological agents, e.g. active dry yeast; chemical agents, e.g. baking powder and potassium bicarbonate; and physical processes, e.g. using air or steam; experimenting with different flours, e.g. plain flour, self-raising flour, bread flour, gluten-free flour; developing different versions of a leavened food; recording results showing the impact of different flours and leavening agents; drawing conclusions to suggest the best leavening agents for different formulations
 - comparing the sensory properties of food science experiments, including appearance, taste, texture, flavour and aroma
 - synthesising primary data from experiments to develop ideas about the formulation of a carbohydrate-based food solution
 - reviewing the food processing techniques used to control the access to and consumability of carbohydrate-based food sources, e.g. application of cold by chilling, freezing; application of heat by boiling, baking, microwaving; exposure to air through dehydration; change of pH through the addition of acid and alkali, addition of additives salt, sugar, antioxidants, yeast, baking powder, cream of tartar; and physical manipulation by aerating, kneading, rolling, shaping
 - explaining the relationships between the structure and functions of carbohydrate and the effects of these in food processing and on food product quality
 - explaining that processing and preservation techniques can increase access to carbohydrate-based food sources for all consumers and will affect transport, storage and distribution.

- Explain the biological, chemical and physical changes that cause food spoilage in carbohydrate-based foods, including
 - biological changes caused by bacteria, yeast and moulds, such as fermentation and spore development
 - chemical changes of retrogradation and syneresis
 - physical changes, e.g. evaporation of moisture in baked goods.
- Explain that carbohydrate-based food sources can be semi-perishable, e.g. fresh pasta, bread and baked goods.
- Explain that carbohydrate-based food sources can be non-perishable, e.g. processed foods such as crackers, dry pasta, flour and rice.

Topic 3: Fat

- Use the problem-solving process in Food & Nutrition to solve fat-based food problems.
- Explain relevant facts related to fat, including
 - the functions of fat in the body
 - providing energy
 - protecting bones and important body organs
 - providing a vessel for fat-soluble vitamins
 - the classifications of fat
 - saturated
 - monounsaturated
 - polyunsaturated
 - trans fat
 - comparing the difference between saturated and unsaturated fat
 - explaining the effects on health of saturated fat and trans fat
 - NRV of fat in the diet.
- Recognise the impacts of over- and under-consumption of fat-based food on health.
- Examine sectors of the food system using fat-based foods, including
 - explaining the production of fat-based food products: the planting, growing and harvesting to produce plant sources of fat, and the raising of animals to produce animal sources of fat
 - explaining the distribution pathways required to process foods in ways that extend shelf life
 - explaining the reasons for and benefits of food processing to consumers, including convenience, cost, access to nutrients and minimisation of seasonality and pathogen growth cycles
 - analysing relationships between the structure and functions of fat, and the effects of these in food processing and on food quality
 - recognising and explaining chemical and functional properties of fat, including describing the sensory properties of appearance, taste, texture, flavour and aroma

- researching the development of new or different fat-based products or emerging plant-based fat products, e.g. coconut oil, avocado oil, hemp seed oil and nut oil products, and their effects on health
- investigating the sustainability of fat-based food production to determine effects on the environment, including the differences between the production of animal- and plant-based food products
- researching alternative waste management methods to limit and dispose of fat-based food waste, including to
 - explain that extending food shelf life and using correct storage methods can assist with sustainability and reduce waste
 - investigate secondary products made using fat, including animal feed and biodiesel.
- Examine fat-based foods, including
 - investigating, using food science experiments, to identify the effects of temperature and manipulation on the chemical and functional properties of fat, e.g.
 - dispersed systems, by explaining the dispersed liquid–liquid system as an emulsion made from two liquids that do not normally mix, usually water-in-oil or oil-in-water mixtures; explaining that emulsions are not stable, that chemicals called emulsifiers are used to stabilise emulsions; describing the effect of chemical emulsifiers; experimenting with the effect emulsifier types on the stability of oil–water dispersions such as mayonnaise
 - viscosity, by comparing and contrasting the role of emulsifiers used for different applications, including salad dressing (water-in-oil emulsion) or mayonnaise (oil-in-water emulsion)
 - powderising, by conducting experiments to create powderised salad dressing
 - spherification, by explaining basic spherification and conducting experiments using basic spherification, e.g. salad dressing caviar
 - recording and analysing experiment results, and drawing conclusions to justify how the properties of fat contribute to the formulation of food products
 - comparing the sensory properties of food science experiments including appearance, taste, texture, flavour and aroma
 - synthesising primary data from experiments to develop ideas about the formulation of a fat-based food solution
 - revising and using sensory profiling to evaluate the quality of different fat-based food products produced in experiments, including appearance, taste, texture (mouthfeel and shortness), flavour and aroma
 - defining and justifying the preferred sensory profiling procedure to determine the quality of the particular types of fat-based food products
 - recording and analysing experiment results and drawing conclusions to justify food formulations and why they are altered to increase the functional and sensory properties of food products
 - explaining that processing techniques can increase accessibility of fat-based foods for all consumers, including isolated and remote consumers

- experimenting with preparation of fat-based foods for consumption, comparing the sensory properties of appearance, taste, texture, flavour and aroma, e.g. frying, stir-frying, baking and roasting
- explaining that the oxidation of fat is referred to as rancidity and that odour development occurs as a result of enzymatic reactions
- recognising and explaining how foods deteriorate at different rates and explain how food composition influences this process, including that
 - fat-based food sources can be perishable and require refrigeration, e.g. dairy and meat sources
 - fat-based food sources can be semi-perishable, e.g. coconut products, avocados, oil and other plant-based fat products, which, depending on climate, may require refrigeration
 - the preservation processes of fat-based food products include refrigeration, freezing and cooking
 - preservation techniques affect the sensory properties of appearance, texture, taste, flavour and aroma of foods, including rancidity in potato chip fat and bloom in chocolate-based food products
- determining which solution best meets the success criteria.

Unit 4: Food solution development for nutrition consumer markets

In Unit 4, students use the problem-solving process to solve food and nutrition problems to improve safety, nutrition, convenience, transparency and accessibility for nutrition consumer markets.

Currently, the food industry and its stakeholders recognise that the climate of consumer needs and wants is dynamic and constantly provides new opportunities in food solution development. Ipsos investigated shifting consumer purchase decisions and behaviours and found that consumers have changed in fundamental ways; their *Food CHATS* report (Ipsos 2016) showed that consumer purchase decisions are increasingly based on a mix of traditional consumer drivers (price, taste and convenience) and evolving consumer drivers (health, safety, social impact, experience and transparency). This creates new challenges and opportunities for food solution development, and industry success will be determined by how effectively these are managed.

In Topic 1, students investigate needs and opportunities for formulating and reformulating foods for nutrition consumer markets. They investigate the food standards code in relation to labelling and health claims.

Topic 2 focuses on the investigation of problems in nutrition consumer markets. Many current formulations of food have high-risk food components, such as salt, sugar, and saturated and trans fats, and are low in dietary fibre. Reformulating to improve the nutritional quality of food solutions presents significant challenges to the food industry, such as maintaining desirable sensory properties and shelf life of a food product.

Unit objectives

1. Recognise and describe facts and principles related to food formulation, and a nutrition consumer market.
2. Explain ideas and problems related to current and emerging nutrition consumer markets.
3. Analyse problems, information and data related to current and emerging nutrition consumer markets.
4. Determine solution requirements and success criteria for nutrition consumer market problems.
5. Synthesise information and data for solutions related to nutrition consumer market problems.
6. Generate nutrition consumer market solutions to provide data to determine the feasibility of the solution.
7. Evaluate and refine ideas and solutions to make justified recommendations for modification or enhancement.
8. Make decisions about and use mode-appropriate features, language and conventions for particular purposes and contexts.

Subject matter

Topic 1: Formulation and reformulation for nutrition consumer markets

- Recognise that a nutrition consumer market (NCM) is represented by individuals and groups who purchase food products, goods and services for their own needs.
- Explain that the purpose of formulation is to combine food components in appropriate ratios, processes or structures, according to a formula.
- Recognise that the purpose of reformulating food products is to produce a different combination of food components, structures or processes for a particular need.
- Explain the purpose of the food standards code related to the labelling of nutritional content, ingredients and the nutrition information panel.
- Explain the purpose of the Food Standards Code related to the Nutrient Profiling Scoring Criterion (NPSC) and health claims
 - list the nutrient content claims and health level claims possible through investigation of legislation from FSANZ
 - investigate cut off levels that apply to health claims for food products
 - explain the different food classifications for NPSC and recognise the scores to be able to make health claims for each food category.
 - use the NPSC to analyse information and data on food packaging to determine the suitability for specific nutrition consumer markets
 - investigate and determine how food formulations solve problems associated with food choices for different nutrition consumers.
- Recall food models used to guide consumer choice regarding foods for healthy eating, e.g. The Australian Guide to Healthy Eating
- Recognise that food products considered unsuitable for specific nutrition consumer markets can be reformulated to achieve suitable nutritional value and palatability to meet consumer needs.
- Develop a list of food products high in salt, fat, sugar, gluten and lactose and low in dietary fibre to reformulate or create new or line extension prototypes to solve problems for nutrition consumer markets.
- Investigate needs or opportunities for formulating and reformulating products to enhance nutritional outcomes, including reducing salt, sugar and/or saturated fat, reducing additives or chemicals, increasing fibre, or using alternative food components.

Topic 2: Nutrition consumer markets

- Use the problem-solving process in Food & Nutrition to solve nutrition consumer market problems.
- Recognise that a nutrition consumer market (NCM) is represented by individuals and groups who purchase food products, goods and services for their own needs.
- Identify each NCM, including the infant, toddler, adolescent, adult, pregnant, elderly, variations of vegetarianism, health conscious, allergic or intolerant, diet related disease/chronic disease (obesity, type 2 diabetes, coronary heart disease) and emerging NCMs.

- Investigate each NCM to explain their dietary and nutritional needs and determine appropriate food choices, such as
 - infant, including high-quality nutrient-dense foods appropriate to each stage of infancy, e.g. increased texture and introduction of new foods
 - toddler, e.g. iron-rich foods, foods low in salt and sugar
 - adolescent, e.g. calcium- and iron-rich foods, nutritious foods to support growth and energy needs
 - adult, e.g. a balanced diet ensuring healthy weight range and nutrient requirements
 - pregnant, e.g. requirements including folate, iron and iodine, and avoidance of the following foods — mould-ripened soft cheese, all types of pâté, raw or partially cooked eggs, raw or undercooked meat, liver products, fish high in mercury, raw shellfish, peanuts, pre-packaged salads, sushi, cold cured meats, unpasteurised milk, alcohol, caffeine and energy drinks
 - elderly, such as lower energy needs due to declining mobility, decreased appetite and the associated need for a nutrient dense diet
 - vegetarian or vegan, including protein, iron, calcium, zinc, vitamins B12 and D
 - health-conscious consumers, such as unprocessed and fresh foods with little or no additives, reduced sugar, salt and saturated fat, less energy-dense foods and regular exercise
 - allergic and food-intolerant, e.g. elimination of foods such as peanuts, tree nuts, eggs, milk, sesame seeds, fish, shellfish, soy and wheat
 - consumers experiencing obesity, including appropriate nutrition and energy intake to support weight loss
 - consumers experiencing type 2 diabetes, and low-GI foods for sustained release of sugar into the blood
 - consumers experiencing coronary heart disease.
- Define chronic disease and diet-related disease as a group of diseases that tend to be long-lasting and have persistent effects.
- Explain that consumers experiencing chronic disease and diet related disease are separate consumer markets with nutritional demands.

- Explain and investigate dietary requirements to prevent or manage issues associated with the NCM, e.g.
 - infant, including iron deficiency and dental caries
 - toddler, e.g. iron, calcium and vitamin D deficiency
 - adolescent, e.g. iron deficiency
 - adult, e.g. prevention of deficiency or issues related to getting older
 - pregnant, including bowel regularity
 - elderly, e.g. osteoporosis, type 2 diabetes, heart disease, stroke, dental issues, bowel regularity and muscle loss
 - vegetarian and vegan, e.g. anaemia
 - allergic or food-intolerant, mandated foods and ingredients from FSANZ and determine which foods commonly cause food intolerance e.g. lactose, gluten and food additives
 - obesity, requirements e.g. smaller portions, limited saturated fat, sugar and salt
 - type 2 diabetes, including consumption of lower GI and whole foods such as vegetables and fruit
 - coronary heart disease, requirements such as increased consumption of fruit and vegetables.
- Analyse food products to determine appropriate food choices and reformulations that are appropriate for the NCM.
- Investigate emerging food products tailored to NCM, e.g. snack food products, gluten-free alternatives, probiotic products, lactose- and dairy-free alternatives, sustainable use of by-products, e.g. whey protein, brewer's spent grain, fruit and vegetable pomace, fermented food, personalised nutrition.
- Select one NCM to use the problem-solving process in Food & Nutrition to solve an NCM problem.

Assessment

Internal assessment 1: Examination — combination response (25%)

Assessment objectives

1. Recognise and describe facts and principles related to the processing, and nutritional, chemical, functional and sensory properties, of carbohydrate- or fat-based food.
2. Explain food science ideas and problems related to carbohydrate- or fat-based food.
3. Analyse problems, information and data related to the properties and processing of carbohydrate- or fat-based food.
4. Determine solution requirements and criteria for carbohydrate- or fat-based food problems.
5. Synthesise chemical, functional and nutritional information and data for carbohydrate- or fat-based food solutions.
7. Evaluate and refine ideas and carbohydrate- or fat-based food solutions to make justified recommendations for enhancement.

Specifications

The teacher provides an examination that includes:

- a combination of short response questions and one extended response question related to Unit 3
- questions that may ask students to respond using
 - single words
 - sentences
 - an extended response
- sufficient opportunities to demonstrate the assessable objectives.

Question specifications

The examination must be aligned to the specifications provided in the table below.

| Question format | Objectives | In these questions, students: |
|--|------------|--|
| Short response | 1, 2, 3, 4 | <ul style="list-style-type: none">• respond to unseen questions, scenarios or problems with unseen stimulus materials• recognise and describe facts and principles• explain food science ideas and problems• use analysis to fully respond to a question, scenario or problem• may be required to label, calculate and graph food and nutrition data |
| Extended response (1 question) — different context from IA2 | 3, 4, 5, 7 | <ul style="list-style-type: none">• respond to a maximum of two unseen problems with seen or unseen stimulus materials• explain food science ideas and problems• use analysis to fully respond to a question, scenario or problem• may be required to label, calculate and graph food and nutrition data• use synthesis and/or evaluation to fully respond to a question• write in full sentences, constructing a response comprising several paragraphs so that ideas are maintained, developed and justified. |

Stimulus specifications

The teacher provides stimulus that when unseen:

- must not be copied from information or texts that students have previously been exposed to or have used directly in class
- is succinct enough to allow students sufficient time to engage with them
- may include stakeholder needs, product lines, consumer trends and nutrition, processing and component information and data related to products.

Conditions

- This is an individual supervised task.
- Time allowed
 - Perusal time: 5 minutes
 - Working time: 120 minutes

Mark allocation

| Criterion | Assessment objectives | Marks |
|-----------------------------|-----------------------|-----------|
| Recognising and Explaining | 1, 2 | 7 |
| Analysing and Determining | 3, 4 | 8 |
| Synthesising and Evaluating | 5, 7 | 10 |
| Total marks: | | 25 |

Instrument-specific marking guide

| Recognising and Explaining | Marks |
|--|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> • accurate and discriminating recognition and discerning description of facts and principles related to the processing, and nutritional, chemical, functional and sensory properties, of carbohydrate- or fat-based food • discerning explanation of food science ideas and problems related to carbohydrate- or fat-based food | 6–7 |
| <ul style="list-style-type: none"> • accurate recognition and effective description of facts and principles related to the processing, and nutritional, chemical, functional and sensory properties, of carbohydrate- or fat-based food • effective explanation of food science ideas and problems related to carbohydrate- or fat-based food | 4–5 |
| <ul style="list-style-type: none"> • appropriate recognition and description of some facts and principles related to the processing, or nutritional, chemical, functional or sensory properties, of carbohydrate- or fat-based food • appropriate explanation of food science ideas and problems related to carbohydrate- or fat-based food | 2–3 |
| <ul style="list-style-type: none"> • variable recognition and superficial description of the processing, or nutritional, chemical, functional or sensory properties, of carbohydrate- or fat-based food • superficial explanation of food science ideas and a problem related to a carbohydrate- or fat-based food solution. | 1 |
| The student response does not match any of the descriptors above. | 0 |

| Analysing and Determining | Marks |
|---|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> • insightful analysis of relevant problems, information and data related to the properties and processing of carbohydrate- or fat-based food to identify constraints • astute determination of <ul style="list-style-type: none"> – solution requirements from the context – success criteria that include the relevant impacts and implications, and the quality and functionality indicators for the carbohydrate- or fat-based food problem | 7–8 |
| <ul style="list-style-type: none"> • considered analysis of relevant problems, information and data related to the properties and processing of carbohydrate- or fat-based food to identify constraints • logical determination of <ul style="list-style-type: none"> – solution requirements from the context – success criteria that include the relevant impacts and implications, and the quality and functionality indicators for the carbohydrate- or fat-based food problem | 5–6 |
| <ul style="list-style-type: none"> • appropriate analysis of problems, information and data related to the properties and processing of carbohydrate- or fat-based food to identify some of the constraints • reasonable determination of some <ul style="list-style-type: none"> – solution requirements from the context – success criteria that include the impacts and implications, and the quality or functionality indicators for the carbohydrate- or fat-based food problem | 3–4 |
| <ul style="list-style-type: none"> • makes statements about a problem or information related to a carbohydrate- or fat-based food problem • vague identification of a criterion for carbohydrate- or fat-based food problems. | 1–2 |
| The student response does not match any of the descriptors above. | 0 |

| Synthesising and Evaluating | Marks |
|---|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> • coherent and logical synthesis of <ul style="list-style-type: none"> – chemical and functional information – nutritional information, and – primary and secondary data for chosen solutions • critical evaluation of ideas and carbohydrate- or fat-based food solutions against success criteria • discerning refinement of ideas and carbohydrate- or fat-based food solutions against success criteria to make astute recommendations for enhancements, justified by data | 9–10 |
| <ul style="list-style-type: none"> • logical synthesis of <ul style="list-style-type: none"> – chemical and functional information – nutritional information, and – primary and secondary data for chosen solutions • reasoned evaluation of ideas and carbohydrate- or fat-based food solutions against success criteria • effective refinement of ideas and carbohydrate- or fat-based food solutions against success criteria to make effective recommendations for enhancements, justified by data | 7–8 |
| <ul style="list-style-type: none"> • simple synthesis of <ul style="list-style-type: none"> – chemical and functional information or – nutritional information, and – primary or secondary data for chosen solutions • feasible evaluation of ideas and carbohydrate- or fat-based food solutions against some success criteria • adequate refinement of ideas and carbohydrate- or fat-based food solutions against some success criteria to make fundamental recommendations for enhancements, justified by data | 5–6 |
| <ul style="list-style-type: none"> • rudimentary synthesis of information and data for a chosen solution • superficial evaluation of ideas and a carbohydrate- or fat-based food solution against some criteria • superficial refinement of ideas and a carbohydrate- or fat-based food solution against some criteria to make elementary recommendations for enhancements. | 3–4 |
| <ul style="list-style-type: none"> • unclear combination of information about a solution for a carbohydrate- or fat-based food problem • identification of a change to an idea or solution. | 1–2 |
| The student response does not match any of the descriptors above. | 0 |

Internal assessment 2: Food & Nutrition solution (25%)

Students document the application of the problem-solving process in response to an identified real-world problem that requires a solution.

Assessment objectives

4. Determine solution requirements and success criteria for a carbohydrate- or fat-based food problem.
5. Synthesise chemical, functional and nutritional information and data to develop ideas for a carbohydrate- or fat-based food solution.
6. Generate a carbohydrate- or fat-based food solution to provide data to determine the feasibility of the solution.
7. Evaluate and refine ideas and a solution to make justified recommendations for enhancement to a carbohydrate- or fat-based food solution.
8. Make decisions about and use mode-appropriate features, language and conventions to communicate development of the solution.

Specifications

This task requires students to:

- analyse the
 - contextual stimulus, including stakeholder needs
 - identification of constraints
 - relevant personal, social, ethical, economic, environmental, legal and/or sustainability impacts and implications of the solution
 - feasibility indicators for the carbohydrate- or fat-based food problem
- determine the
 - solution requirements
 - success criteria used to evaluate the solution
- synthesise
 - food and nutrition information and data
 - experimental data of at least three prototypes about alternative ideas
 - alternative ideas to determine a final proposed solution
- generate the final proposed solution for the carbohydrate- or fat-based food problem to provide data to determine the feasibility of the solution
- evaluate and refine ideas and the solution, using success criteria and generated data to recommend and justify enhancements to ideas and the solution to the carbohydrate- or fat-based food problem

- communicate
 - the application of the problem-solving process in response to the carbohydrate- and/or fat-based food problem using written and visual features, e.g. annotations, diagrams, sketches, drawings, photographs, and a final proposed solution
 - data using diagrams, tables, graphs and spreadsheets.

It is recommended that this task is designed so that students can develop a response in approximately 15 hours of class time.

Stimulus specifications

The teacher provides a contextual stimulus related to a carbohydrate- or fat-based food problem, which may include stakeholder needs, product lines and data related to products or consumers that will have an impact on the problem, e.g. focus group data.

Conditions

- Students can develop their responses in class time and their own time.
- This is an individual task.

Response requirements

Written and visual (including images, graphs, calculations and diagrams): up to 10 A4 pages, up to 2000 words

Mark allocation

| Criterion | Assessment objectives | Marks |
|----------------------------|-----------------------|-----------|
| Determining and Generating | 4, 6 | 8 |
| Synthesising | 5 | 7 |
| Evaluating | 7 | 7 |
| Communicating | 8 | 3 |
| Total marks: | | 25 |

Instrument-specific marking guide

| Determining and Generating | Marks |
|---|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> • astute determination of <ul style="list-style-type: none"> – solution requirements from the context – success criteria that include the relevant impacts and implications, and the quality and functionality indicators for the carbohydrate- or fat-based food problem • purposeful generation of a carbohydrate- or fat-based food processing solution to provide valid sensory profiling data to determine the feasibility of the solution | 7–8 |
| <ul style="list-style-type: none"> • logical determination of <ul style="list-style-type: none"> – solution requirements from the context – success criteria that include the impacts and implications, and the quality and functionality indicators for the carbohydrate- or fat-based food problem • effective generation of a carbohydrate- or fat-based food processing solution to provide valid sensory profiling data to determine the feasibility of the solution | 5–6 |
| <ul style="list-style-type: none"> • reasonable determination of <ul style="list-style-type: none"> – some solution requirements from the context – success criteria that include impacts and implications, and the quality or, functionality indicators for the carbohydrate- or fat-based food problem • adequate generation of a carbohydrate- or fat-based food processing solution to provide relevant sensory profiling data to determine the feasibility of the solution | 3–4 |
| <ul style="list-style-type: none"> • vague identification of a criterion for a carbohydrate- or fat-based food problem. • partial generation of a carbohydrate- or fat-based food processing solution to provide some sensory profiling data to determine the feasibility of the solution | 2 |
| <ul style="list-style-type: none"> • generation of parts of a solution. | 1 |
| The student response does not match any of the descriptors above. | 0 |

| Synthesising | Marks |
|---|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> • coherent and logical synthesis of chemical, functional and nutritional information, and primary and secondary data for chosen solutions | 6–7 |
| <ul style="list-style-type: none"> • logical synthesis of chemical, functional and nutritional information, and primary and secondary data for chosen solutions | 4–5 |
| <ul style="list-style-type: none"> • simple synthesis of chemical, functional or nutritional information, and primary or secondary data for chosen solutions | 3 |
| <ul style="list-style-type: none"> • rudimentary synthesis of information and data for a chosen solution | 2 |
| <ul style="list-style-type: none"> • unclear combination of information or ideas about a carbohydrate- or fat-based food problem. | 1 |
| The student response does not match any of the descriptors above. | 0 |

| Evaluating | Marks |
|---|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> • critical evaluation of ideas and the generated solution against success criteria • discerning refinement, of ideas and the generated solution <ul style="list-style-type: none"> – against success criteria and data, considering impacts and implications of the solution – to make astute recommendations for enhancements, justified by data | 6–7 |
| <ul style="list-style-type: none"> • reasoned evaluation of ideas and a solution against success criteria • effective refinement of ideas and a solution <ul style="list-style-type: none"> – against success criteria – to make effective recommendations for enhancements, justified by data | 4–5 |
| <ul style="list-style-type: none"> • feasible evaluation of ideas and a solution against success criteria to make <ul style="list-style-type: none"> – adequate refinement of ideas and a solution – fundamental recommendations for enhancements, justified by data | 3 |
| <ul style="list-style-type: none"> • superficial evaluation of ideas and a solution against some criteria • refinement of ideas and a solution against some criteria to make elementary recommendations for enhancements | 2 |
| <ul style="list-style-type: none"> • identification of a change to idea or solution. | 1 |
| The student response does not match any of the descriptors above. | 0 |

| Communicating | Marks |
|---|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> • discerning decision-making about and fluent use of <ul style="list-style-type: none"> – written and visual (if appropriate) features to communicate a solution – language for a technical audience – grammatically accurate language structures • referencing and report conventions | 2–3 |
| <ul style="list-style-type: none"> • variable decision-making about and inconsistent use of <ul style="list-style-type: none"> – written and visual (if appropriate) features – suitable language – grammar and language structures • referencing or report conventions. | 1 |
| • The student response does not match any of the descriptors above. | 0 |

Internal assessment 3: Food & Nutrition solution (25%)

Students documenting the application of a problem-solving process in response to an identified real-world problem that requires a solution.

Assessment objectives

4. Determine solution requirements and success criteria for a selected nutrition consumer market problem.
5. Synthesise information and data to develop ideas for a solution related to a selected nutrition consumer market problem.
6. Generate a nutrition consumer market solution to provide data to determine the feasibility of the solution.
7. Evaluate and refine ideas and a solution to make justified recommendations for enhancement.
8. Make decisions about and use mode-appropriate features, language and conventions for particular purposes and contexts.

Specifications

This task requires students to:

- identify an appropriate problem from one of the following nutrition consumer markets
 - infant
 - toddler
 - adolescent
 - adult
 - pregnant
 - elderly
 - health-conscious
 - vegetarian or vegan
 - allergic or food-intolerant
 - consumers experiencing diet-related conditions or chronic disease, such as obesity, heart disease or type 2 diabetes
- analyse the
 - problem stimulus, including stakeholder needs
 - information and data related to food formulation for a nutrition consumer market to identify constraints, and their relationship to the problem
 - relevant personal, social, ethical, economic, environmental, legal and/or sustainability impacts and implications of the solution
 - feasibility indicators for the nutrition consumer market problem

- determine
 - solution requirements
 - success criteria used to evaluate the solution
- synthesise
 - food and nutrition information and data
 - experimental data of at least three prototypes about alternative solution ideas
 - alternative solutions ideas to determine a final proposed solution
- generate the final proposed solution for the nutrition consumer market problem to provide data to determine the feasibility of the solution
- evaluate and refine ideas and the solution, using success criteria and generated data to recommend and justify enhancements to ideas and the solution to the nutrition consumer market problem
- communicate
 - the application of the problem-solving process in response to the nutrition consumer market problem using written or visual features, e.g. annotations, diagrams, sketches, drawings, photographs, or a prototype
 - data using diagrams, tables, graphs and spreadsheets.

It is recommended that this task is designed so that students can develop a response in approximately 15 hours of class time.

Stimulus specifications

The teacher provides stimulus that contains contextual information about stakeholder needs from one of the specific nutrition consumer markets, which may include product lines and data related to products or consumers that will have an impact on the problem.

Conditions

- Students can develop their responses in class time and their own time.
- This is an individual task.

Response requirements

Written and visual (including images, graphs, calculations and diagrams): up to 10 A4 pages, up to 2000 words

Mark allocation

| Criterion | Assessment objectives | Marks |
|----------------------------|-----------------------|-----------|
| Determining and Generating | 4, 6 | 8 |
| Synthesising | 5 | 7 |
| Evaluating | 7 | 7 |
| Communicating | 8 | 3 |
| Total marks: | | 25 |

Instrument-specific marking guide

| Determining and Generating | Marks |
|---|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> • astute determination of <ul style="list-style-type: none"> – solution requirements – success criteria that include the relevant impacts and implications of, and the quality and functionality indicators for, a selected problem that affects a nutrition consumer market • purposeful generation of a nutrition consumer market solution to provide valid sensory profiling data to determine the feasibility of the solution | 7–8 |
| <ul style="list-style-type: none"> • logical determination of <ul style="list-style-type: none"> – solution requirements – success criteria that include the relevant impacts and implications of, and the quality and functionality indicators for, a selected problem that affects a nutrition consumer market • effective generation of a nutrition consumer market solution to provide valid sensory profiling data to determine the feasibility of the solution | 5–6 |
| <ul style="list-style-type: none"> • reasonable determination of some <ul style="list-style-type: none"> – solution requirements – success criteria that include impacts and implications of, and the quality or functionality indicators for, a selected problem that affects a nutrition consumer market • adequate generation of a nutrition consumer market solution to provide relevant sensory profiling data to determine the feasibility of the solution | 3–4 |
| <ul style="list-style-type: none"> • vague determination of some <ul style="list-style-type: none"> – solution requirements – success criteria that include some of the impacts and implications of, and the quality or functionality indicators for, a selected problem that affects a nutrition consumer market • partial generation of a nutrition consumer market solution to provide some sensory profiling data to determine the feasibility of the solution | 2 |
| <ul style="list-style-type: none"> ▪ vague identification of a criterion for the consumer market ▪ generation of parts of a solution. | 1 |
| The student response does not match any of the descriptors above. | 0 |

| Synthesising | Marks |
|---|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> coherent and logical synthesis of chemical, functional and nutritional information, and primary and secondary data for chosen solutions | 6–7 |
| <ul style="list-style-type: none"> logical synthesis of chemical, functional and nutritional information, and primary and secondary data for chosen solutions | 4–5 |
| <ul style="list-style-type: none"> simple synthesis of chemical, functional or nutritional information, and primary or secondary data for chosen solutions | 3 |
| <ul style="list-style-type: none"> rudimentary synthesis of information and data for a chosen solution | 2 |
| <ul style="list-style-type: none"> unclear combination of information or ideas about a nutrition consumer problem. | 1 |
| The student response does not match any of the descriptors above. | 0 |

| Evaluating | Marks |
|---|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> critical evaluation of ideas and a solution against success criteria discerning refinement of ideas and a solution, against success criteria, to make astute recommendations for enhancements, justified by data | 6–7 |
| <ul style="list-style-type: none"> reasoned evaluation of ideas and the generated solution against success criteria effective refinement of ideas and the generated solution, against success criteria, to make effective recommendations for enhancements, justified by data | 4–5 |
| <ul style="list-style-type: none"> feasible evaluation of ideas and a solution against success criteria adequate refinement of ideas and a solution, against success criteria, to make fundamental recommendations for enhancements, justified by data | 3 |
| <ul style="list-style-type: none"> superficial evaluation of ideas and a solution against some criteria refinement of ideas and a solution, against some criteria, to make elementary recommendations for enhancements | 2 |
| <ul style="list-style-type: none"> identification of a change to an idea or solution. | 1 |
| The student response does not match any of the descriptors above. | 0 |

| Communicating | Marks |
|---|-------|
| The student response has the following characteristics: | |
| <ul style="list-style-type: none"> • discerning decision-making about and fluent use of <ul style="list-style-type: none"> – written and visual (if appropriate) features to communicate a solution – language for a technical audience – grammatically accurate language structures • referencing and report conventions | 2–3 |
| <ul style="list-style-type: none"> • variable decision-making about and inconsistent use of <ul style="list-style-type: none"> – written and visual (if appropriate) features – suitable language – grammar and language structures • referencing or report conventions. | 1 |
| <ul style="list-style-type: none"> • The student response does not match any of the descriptors above. | 0 |

External assessment: Examination — combination response (25%)

External assessment is developed and marked by the QCAA. The external assessment in Food & Nutrition is common to all schools and administered under the same conditions, at the same time, on the same day.

Assessment objectives

1. Recognise and describe facts and principles related to the food formulation and nutrition consumer markets.
2. Explain ideas and problems related to current and emerging nutrition consumer markets .
3. Analyse problems, information and data related to current and emerging nutrition consumer markets.
4. Determine solution requirements and criteria for nutrition consumer market problems .
5. Synthesise information and data for solutions related to nutrition consumer market problems.
7. Evaluate and refine ideas and solutions to make justified recommendations for enhancement.

Specifications

This examination:

- consists of a number of different types of questions relating to Unit 4
- may ask students to respond using
 - single words or dot points
 - sentences or paragraphs
 - an extended response, constructing a response of several paragraphs so that ideas are maintained, developed and justified
- may ask students to
 - respond to an unseen question/s, scenario/s or problem/s with unseen stimulus materials
 - draw, label, graph and tabulate food and nutrition data
 - analyse, synthesise and/or evaluate to fully respond to a question, scenario or problem
 - respond to one problem for the extended response from a maximum of two.

Conditions

- Time allowed
 - Perusal time: 5 minutes
 - Working time: 120 minutes

Glossary

The syllabus glossary is available at www.qcaa.qld.edu.au/downloads/senior-qce/common/snr_glossary_cognitive_verbs.pdf.

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Version history

| Version | Date of change | Information |
|---------|----------------|--|
| 1.0 | January 2024 | Released for familiarisation and planning (with implementation starting in 2025) |

