For teaching
•In Australian and SACE International schools from January 2019 to December 2019
•In SACE International schools only, from May/June 2019 to March 2020

SACE Board and Government of South Australia logos with an image of the SACE Board brand illustration.
Nutrition

OFFICIAL

2023 Subject Outline | Stage 2

For teaching

* In Australian and SACE International schools from January 2023 to December 2023
* In SACE International schools only, from May/June 2023 to March 2024

Published by the SACE Board of South Australia,  
11 Waymouth Street, Adelaide, South Australia 5000

OFFICIAL

Copyright © SACE Board of South Australia 2020

First published 2020

Published online November 2020

Reissued for 2022, 2023

ISBN 978 1 74102 954 3 (online Microsoft Word version)

ref: A1095160

*This subject outline is accredited for teaching at Stage 2 from 2021*

contents

Introduction 1

Subject description 1

Capabilities 2

Aboriginal and Torres Strait Islander knowledge, cultures, and perspectives 4

Learning scope and requirements 5

Learning requirements 5

Content 5

Assessment scope and requirements 26

Evidence of learning 26

Assessment design criteria 26

School assessment 27

External assessment 32

Performance standards 32

Assessment integrity 34

Support materials 35

Subject-specific advice 35

Advice on ethical study and research 35

Introduction

Subject description

Nutrition is a 20-credit subject at Stage 2.

Nutrition is a science which immerses students in the fundamentals of human nutrition, physiology and health and promotes investigation of current and emerging trends. It is the study of dietary, lifestyle, and healthy eating patterns with specific focus on nutrients in food, how the body uses nutrients, and the relationship between diet, health, and disease. Students apply knowledge and understanding of nutrition to conduct investigations and examine scenarios. Students use technologies, scientific evidence, and research to critically analyse information and make informed decisions or recommendations.

Students consider how the food and nutrition needs of different population demographics are affected by food availability and product development. Students examine political, economic, cultural, and ethical influences and ecological sustainability in order to recommend actions or develop arguments about future food needs and food ethics. Critical literacy and numeracy skills and a deep understanding of nutrients enable students to analyse diets that improve health outcomes for individuals, community groups, and/or society.

Students develop an understanding of the need to evaluate food systems and food quality standards, marketing of food, food availability, and cultural influences on food selection. Through this understanding, students develop their personal and social capabilities, and ethical and intercultural understanding. Students explore the link between food systems, environmental impacts, climate change, and food sustainability. They suggest solutions to complex issues, informed by current research and Australian consumer-protection practices.

Students have opportunities to investigate contemporary issues of global and local food trends, advances in technology, and the development of new foods and food packaging. These issues will affect the future health and nutrition of populations.

Capabilities

The capabilities connect student learning within and across subjects in a range of contexts.

The SACE identifies seven capabilities. They are:

* literacy
* numeracy
* information and communication technology (ICT) capability
* critical and creative thinking
* personal and social capability
* ethical understanding
* intercultural understanding.

Literacy

In this subject students extend and apply their literacy capability by, for example:

* communicating appropriately using nutrition and food literacy for specific purposes and audiences
* using a range of communication formats to express ideas logically and fluently, incorporating the terminology and conventions of nutrition
* comprehending and interpreting the work of scientists across disciplines, using nutrition knowledge
* critically analysing and evaluating primary and secondary data
* identifying nutrition information presented in a variety of modes
* synthesising evidence to produce a logical argument
* formulating appropriate questions and hypotheses that guide nutrition investigations and their design.

Numeracy

In this subject students extend and apply their numeracy capability by, for example:

* solving problems using calculations and critical thinking skills
* measuring with appropriate instruments
* recording, collating, representing, and analysing primary data
* accessing and interpreting secondary data
* identifying and interpreting trends and relationships between data sets
* calculating and predicting values by manipulating data and using appropriate scientific conventions.

Information and communication technology (ICT) capability

In this subject students extend and apply their ICT capability by, for example:

* locating and accessing information
* collecting, analysing, and representing data electronically
* using technologies to create new ways of thinking about nutrition
* communicating ideas, processes, and information about nutrition
* understanding the impact of technological devices on the development of nutrition and its application in society
* evaluating the application of ICT to advance understanding and investigations in nutrition.

Critical and creative thinking

In this subject students extend and apply their critical and creative thinking capability by, for example:

* analysing and interpreting problems or issues from different perspectives
* constructing a hypothesis and designing an experiment, observational study, or investigation
* interpreting and evaluating data and procedures to develop logical conclusions
* analysing interpretations and claims, for validity and reliability
* devising innovative solutions to nutrition issues and making reasonable predictions
* recognising the value of creative thinking on the development of nutrition knowledge.

Personal and social capability

In this subject students extend and apply their personal and social capability by, for example:

* understanding the importance of nutrition knowledge on health and wellbeing, both personally and globally
* making decisions and taking initiative while working independently and collaboratively
* planning effectively, managing time, following procedures, and working safely
* sharing and discussing ideas about nutrition issues, developments, and innovations while respecting the perspectives of others
* analysing the role of their own beliefs and attitudes on personal nutrition status
* analysing cultural beliefs and attitudes and the impact of these on nutrition
* seeking, valuing, and acting on feedback.

Ethical understanding

In this subject students extend and apply their ethical understanding capability by, for example:

* considering the implications of their investigations on food production sustainability
* making ethical decisions based on an understanding of nutrition principles
* using data and reporting the outcomes of investigations accurately and fairly
* acknowledging the need to plan for the future and to protect and sustain the biosphere
* recognising the importance of their responsible participation in influencing policies and practices in society
* respecting individual values and preferences relating to nutrition choices
* understanding the influence of food production on environmental sustainability.

Intercultural understanding

In this subject students extend and apply their intercultural understanding capability by, for example:

* recognising that nutrition is a science with significant contributions from diverse cultures
* respecting and engaging with different cultural views and customs
* understanding that nutrition is influenced by cultural factors
* acknowledging traditional foods within Aboriginal and Torres Strait Islander communities
* negotiating diverse cultural perspectives
* incorporating a range of cultural knowledge about nutrition.

Aboriginal and Torres Strait Islander knowledge, cultures, and perspectives

In partnership with Aboriginal and Torres Strait Islander communities, and schools and school sectors, the SACE Board of South Australia supports the development of high‑quality learning and assessment design that respects the diverse knowledge, cultures, and perspectives of Indigenous Australians.

The SACE Board encourages teachers to include Aboriginal and Torres Strait Islander knowledge and perspectives in the design, delivery, and assessment of teaching and learning programs by:

* providing opportunities in SACE subjects for students to learn about Aboriginal and Torres Strait Islander histories, cultures, and contemporary experiences
* recognising and respecting the significant contribution of Aboriginal and Torres Strait Islander peoples to Australian society
* drawing students’ attention to the value of Aboriginal and Torres Strait Islander knowledge and perspectives from the past and the present
* promoting the use of culturally appropriate protocols when engaging with and learning from Aboriginal and Torres Strait Islander peoples and communities.

Learning scope and requirements

Learning requirements

The learning requirements summarise the knowledge, skills, and understanding that students are expected to develop and demonstrate through their learning in Stage 2 Nutrition.

In this subject, students are expected to:

1. apply knowledge and understanding of nutrition concepts and food ethics in diverse contexts

2. design and conduct nutrition investigations, using appropriate methodologies

3. analyse and interpret data and/or information from nutrition investigations and justify conclusions

4. apply critical and creative thinking skills in response to nutrition issues

5. explore and understand nutrition science as a human endeavour

6. communicate knowledge and understanding of nutrition concepts and nutrition literacy and numeracy.

Content

Stage 2 Nutrition is a 20-credit subject that consists of the following three concepts and two underpinning skill sets:

Concepts

* Principles of nutrition, physiology, and health
* Health promotion and emerging trends
* Sustainable food systems

Underpinning skill sets

* Nutrition literacy and numeracy
* Nutrition and technology.

At Stage 2, the concepts are referred to as topics. Students study all three topics.

‘Nutrition literacy and numeracy’ and ‘Nutrition and technology’ underpin the content. They are not discrete concepts taught in isolation but should be contextualised through case studies and real-life examples.

Nutrition literacy and numeracy involves students developing the skills to research and understand different sources of information. Students interpret and make decisions about nutrition information and advice. They consider how and where to seek contemporary, valid, and reliable information to promote and maintain good nutrition.

Nutrition and technology involves students developing skills to use computer applications to source and analyse nutritional information and in understanding how advances in technology are changing the way foods are produced, manufactured, distributed, and marketed. Improving people’s access to, and understanding of, nutrition information empowers them to make informed decisions.

The relationship of these is shown in the following diagram.

Diagram

Description automatically generated

The concepts/topics in Stage 2 Nutrition provide the framework for developing integrated programs of learning through which students extend their skills, knowledge, and understanding of the following three strands of science:

* science inquiry skills
* science as a human endeavor
* nutrition science understanding.

The descriptions of the science inquiry skills and the areas for nutrition understanding are structured in two columns: the left-hand column sets out the science inquiry skills or nutrition understanding and the right-hand column sets out possible contexts.

Together with science as a human endeavour, the science inquiry skills and nutrition understanding form the basis of teaching, learning, and assessment in this subject.

The possible contexts are suggestions for potential inquiry approaches, and are neither comprehensive nor exclusive. Teachers may select from these and are encouraged to consider other inquiry approaches according to local needs and interests.

The following pages describe the three strands of science in more detail.

Within the descriptions, the following symbols are used in the possible contexts to show how a strand of science can be integrated:

|  |  |
| --- | --- |
|  | indicates a possible teaching and learning strategy for science understanding |
|  | indicates a possible science inquiry activity |
|  | indicates a possible focus on science as a human endeavour. |

Science Inquiry Skills

In Nutrition, investigation is an integral part of the learning and understanding of concepts.

Practical investigations involve a range of both individual and collaborative activities, during which students extend the science inquiry skills described in the table that follows.

Practical activities may take a range of experimental and observational forms. Students develop investigable questions and/or testable hypotheses, and select and use equipment appropriately to collect data. The data may be observations, measurements, or other information obtained during the investigation. Students represent and analyse the data they have collected; evaluate procedures, and describe the limitations of the data and procedures; consider explanations for their observations; and present and justify conclusions appropriate to the initial question or hypothesis.

It is recommended that class time involves some practical activities.

Science inquiry skills are fundamental to students investigating the social, ethical, and environmental impacts and influences of the development of scientific understanding and the applications, possibilities, and limitations of science. These skills enable students to critically consider the evidence they obtain so that they can present and justify conclusions.

| Science Inquiry Skills | Possible contexts |
| --- | --- |
| Scientific methods enable systematic investigation to obtain measurable evidence.   * Design and conduct an experiment, observational study, or investigation, including: * a hypothesis or inquiry question * types of variables * dependent * independent * factors held constant (how and why they are controlled) * factors that may not be able to be controlled (and why). * materials required * the method to be followed, with justification * the type and amount of data to be collected * identification of ethical and safety considerations. | Develop inquiry skills by, for example:   * designing investigations that require investigable questions and imaginative solutions (with or without implementation) * critiquing proposed investigations * using the conclusion of one investigation to propose subsequent experiments * changing an independent variable in a given procedure and adapting the method * researching, developing, and trialling a method * improving an existing procedure * identifying options for measuring the dependent variable * developing safety audits * identifying relevant ethical and/or legal considerations in different context. * comparing experimental and observational research methodologies. |
| Obtaining meaningful data depends on conducting investigations using appropriate procedures and safe, ethical working practices.   * Conduct investigations, including: * selection and safe use of appropriate materials, apparatus, and equipment * collection of appropriate primary and/or secondary data (numerical, visual, descriptive) * individual and collaborative work. | Develop inquiry skills by, for example:   * identifying equipment, materials, or instruments fit for purpose * practising techniques and safe use of apparatus * comparing resolution of different measuring tools * distinguishing between, and using, primary and secondary data. |
| Results of investigations are represented in a well-organised way to allow them to be interpreted.   * Represent results of investigations in appropriate ways, including: * use of appropriate SI units, symbols * construction of appropriately labelled tables * drawing of graphs. | Develop inquiry skills by, for example:   * practising constructing tables to tabulate data, including column and row labels with units * identifying the appropriate representations to graph different data sets * selecting appropriate axes and scales to graph data * comparing data from different sources to describe as quantitative or qualitative. |
| Scientific information can be presented using different types of symbols and representations.   * Select, use, and interpret appropriate representations to explain concepts, solve problems, and make predictions. | Develop inquiry skills by, for example:   * writing equations * drawing and labelling diagrams * recording images * constructing flow diagrams. |
| Analysis of the results of investigations allows them to be interpreted in a meaningful way.   * Analyse data, including identification and discussion of trends, patterns, and relationships. | Develop inquiry skills by, for example:   * analysing data sets to identify trends and patterns * determining relationships between independent and dependent variables * using graphs from different sources (e.g. CSIRO, the Australian Bureau of Statistics (ABS), or Food Standards Australia New Zealand (FSANZ)) to predict values other than plotted points * calculating mean values. |
| Critical evaluation of procedures and data can determine the meaningfulness of the results.   * Identify sources of uncertainty, including: * random and systematic errors * Evaluate reliability, accuracy, and validity of results, by discussing factors including: * sample size * random error * systematic error. | Develop inquiry skills by, for example:   * discussing how the repeating of an investigation with different materials/equipment may detect a systematic error * using an example of an investigation report to develop report-writing skills. |
| Conclusions can be formulated that relate to the hypothesis or inquiry question.   * Select and use evidence and scientific understanding to make and justify conclusions. * Recognise the limitations of conclusions. * Recognise that the results of some investigations may not lead to definitive conclusions. | Develop inquiry skills by, for example:   * evaluating procedures and data sets to determine and comment on the limitations of possible conclusions * using data sets to discuss the limitations of the data in relation to the range of possible conclusions that could be made. |
| Effective scientific communication is clear and concise.   * Communicate to specific audiences and for specific purposes using appropriate: * language * terminology * conventions. | Develop inquiry skills by, for example:   * reviewing scientific articles or presentations to recognise conventions * developing skills in referencing and/or footnoting * distinguishing between reference lists and bibliographies * practising scientific communication in written, oral, and multimodal formats (e.g. presenting a podcast or writing a blog). |

 Science as a Human Endeavour

The science as a human endeavour strand highlights the development of science as a way of knowing and doing, and explores the purpose, use, and influence of science in society.

By exploring science as a human endeavour, students develop and apply their understanding of the complex ways in which nutrition science interacts with society, and investigate the dynamic nature of nutrition science. They explore how nutritionists and other scientists develop new understanding and insights, and produce innovative solutions to everyday and complex problems and challenges in local, national, and global contexts. In this way, students are encouraged to think scientifically and make connections between the work of others and their own learning. This enables them to explore their own solutions to current and future problems and challenges.

Students understand that the development of science concepts, models, and theories is a dynamic process that involves analysis of evidence and sometimes produces ambiguity and uncertainty. They consider how and why science concepts, models, and theories are continually reviewed and reassessed as new evidence is obtained and as emerging technologies enable new avenues of investigation. They understand that scientific advancement involves a diverse range of individual scientists and teams of scientists working within an increasingly global community of practice.

Students explore how scientific progress and discoveries are influenced and shaped by a wide range of social, economic, ethical, and cultural factors. They investigate ways in which the application of science may provide great benefits to individuals, the community, and the environment, but may also pose risks and have unexpected outcomes. They understand how decision-making about socio-scientific issues often involves consideration of multiple lines of evidence and a range of needs and values. As critical thinkers, they appreciate science as an ever-evolving body of knowledge that frequently informs public debate, but is not always able to provide definitive answers.

The key concepts of science as a human endeavour underpin the contexts, approaches, and activities in this subject, and must be integrated into all teaching and learning programs.

The key concepts of science as a human endeavour, with elaborations that are neither comprehensive nor exclusive, in the study of Nutrition are:

Communication and Collaboration

* Science is a global enterprise that relies on clear communication, international conventions, and review and verification of results.
* Collaboration between scientists, governments, and other agencies is often required in scientific research and enterprise.

Development

* Development of complex scientific models and/or theories often requires a wide range of evidence from many sources and across disciplines.
* New technologies improve the efficiency of scientific procedures and data collection and analysis. This can reveal new evidence that may modify or replace models, theories, and processes.

Influence

* Advances in scientific understanding in one field can influence and be influenced by other areas of science, technology, engineering, and mathematics.
* The acceptance and use of scientific knowledge can be influenced by social, economic, cultural, and ethical considerations.

Application and Limitation

* Scientific knowledge, understanding, and inquiry can enable scientists to develop solutions, make discoveries, design action for sustainability, evaluate economic, social, cultural, and environmental impacts, offer valid explanations, and make reliable predictions.
* The use of scientific knowledge may have beneficial or unexpected consequences; this requires monitoring, assessment, and evaluation of risk, and provides opportunities for innovation.
* Science informs public debate and is in turn influenced by public debate; at times, there may be complex, unanticipated variables or insufficient data that may limit possible conclusions.

Topic 1: Principles of nutrition, physiology, and health

Students analyse the impact of diet on health and wellbeing throughout the life cycle. They develop the skills to explore the nature of diet-related disorders while exploring links with the biochemistry of nutrients: their structure, function, and interaction. The study of the digestive system will generate discussion about the influence of the microbiome on health and malabsorption syndromes. Students analyse and evaluate data and scenarios, and provide solutions to complex problems requiring analysis.

Students:

* understand the biochemistry of nutrients: their structure, function, and interaction
* understand the nature of diet-related disorders
* understand the digestive system
* understand the impact of diet on health and wellbeing throughout the life cycle
* analyse and evaluate data and scenarios.

| Nutrition Understanding | Possible contexts |  |
| --- | --- | --- |
| The importance of the macronutrients (proteins, carbohydrates, lipids) and water, and their respective energy values.   * Nutrient energy values in kJ per gram: * proteins, 16.7 kJ per gram * carbohydrates, 16.7 kJ per gram * lipids, 37.7 kJ per gram * alcohol, 29.3 kJ per gram * water, 0 kJ per gram. * Composition of macronutrients in food. * Recommended proportions of individual macronutrients as a percentage of the total macronutrients with reference to the Australian Macronutrient Distribution Range (AMDR). * Nutrient reference values: * recommended daily intake (RDI) * estimated average requirement (EAR) * adequate intake (AI) * tolerable upper intake level (UL) * estimated energy requirement (EER). | Explain why hydration and macronutrients are important to human health.  Identify the nutrient energy values of each macronutrient (protein, carbohydrate, lipid), plus alcohol and water.  Determine the energy (kJ) provided and the percentage provided of one or more macronutrients from a lunchbox or a meal.  Investigate the energy provided by each macronutrient of a specific food (e.g. a meat pie) to compare with the nutrition information panel to assess the accuracy of this information. |  |
| Research statistics to determine the average macronutrient distribution range for different ages and genders.  Compare, using a case study, the RDI, EAR, AI, and UL of different nutrients consumed over a 24-hour period. |  |
| Digestion and metabolism of food influences the absorption and use of nutrients.   * The processes of ingesting and digesting food/fluids and the absorption of macronutrients: * gastrointestinal tract * organs involved in digestion and their functions * digestion of macronutrients and their resulting building blocks * the chemical digestion of macronutrients involving their respective enzymes * salivary amylase * gastric pepsin * trypsin * pancreatic amylase and lipase * intestinal sucrase, maltase and lactase * mechanical digestion * mastication * peristalsis * emulsification of bile * absorption of products of macronutrient digestion in the villi * role of large intestine in digestion * water absorption * the microbiome in the large intestine * understanding the importance of a diverse microbiome in recovery to disturbances * infection * antibiotics * the role of prebiotics and probiotics in maintaining and enhancing the diversity of the microbiome * the synthesis of Vitamin K and free fatty acids * factors that interfere with the absorption of nutrients * coeliac disease * lactose intolerance * factors that determine basal metabolic rates (BMR) and estimated energy expenditure (EEE). | Illustrate and explain the structure and function of the primary and secondary organs of the digestive system.  Explore the digestion of different foods containing different macronutrients.  Determine the mechanical and chemical digestion of different macronutrients and where these occur in the digestive system.  Compare the absorption of the products of digestion in the villi and the digestive system.  Describe the chemical processes related to metabolism and release of energy.  Explore the different malabsorption syndromes of coeliac disease and lactose intolerance in different populations.  Compare the BMRs of females and males. Determine the factors that make them different. |  |
| Demonstrate the emulsifying action of bile by using oil, water, and detergent.  Explain and calculate, using a case study, the EER of a person. |  |
| Conduct an experiment to measure the absorption of iron in varying pH environments, by using dialysis tubing. |  |
| Explore how the use of antibiotics in food has affected human health.  Research the use of different cereals to produce gluten-free bread. |  |
| Macronutrients have a specific function and structure.  Proteins   * the functional roles of protein as a nutrient * the general structure of amino acids * essential, non-essential, and conditional (e.g. due to infancy, illness, or a vegan diet) amino acids * the biological value of protein sources, including complete and incomplete proteins * plant, animal, and novel sources of protein in the diet. | Explain the function of protein in different parts of the body, such as for muscle growth and repair, hormones, enzymes, and antibodies.  Explain nitrogen balance in relation to protein requirements in specific groups, such as athletes, the elderly, or the immunocompromised.  Discuss the different types of amino acids (essential, non-essential, and conditional) for different populations, such as vegans and vegetarians.  Compare complete and incomplete proteins and determine sources from both animal and plant foods. |  |
| Conduct an experiment to recognise and compare the amount of macronutrients in different foods. |  |
| Assess the validity of the claim that low-protein, high-carbohydrate diets lead to longer life in humans.  Investigate the applications and limitations of lactose-free milk.  Investigate the nutrition obtained from edible insects and assess the potential benefits for future populations. |  |
| Lipids   * the functional roles of lipids (fats) as a nutrient * the structure and sources of the following fatty acids: * saturated * unsaturated * monounsaturated * polyunsaturated * trans fatty acids. * the role of omega‑3 and omega‑6 essential fatty acids in the diet * sources and functions of blood cholesterol. | Compare and describe the structural characteristic differences between saturated, polyunsaturated, monounsaturated and trans fatty acids.  Explore the differences between low-density lipoproteins (LDLs) and high-density lipoproteins (HDLs), and their health effects, including dietary diseases.  Explore the links between the consumption of saturated fatty acids and obesity, cardiovascular disease (CVD), and hypertension. |  |
| Investigate the effects of changing the cooking temperature when using monounsaturated fatty acids and saturated fatty acids. |  |
| Discuss the potential of lipids found in different seeds to improve health outcomes of communities, and the ethical and environmental impacts of the seeds’ production. |  |
| Carbohydrates   * the structure, sources, and functions of carbohydrate as a nutrient * the nutrition significance of the following carbohydrates: * polysaccharides * disaccharides * monosaccharides * glucose. * the effects of different carbohydrates on blood glucose (blood sugar) levels * the role of soluble and insoluble fibre in the body. | Represent the chemical structure of glucose and the bonding required to synthesise disaccharides and polysaccharides.  Determine the food sources for the different types of carbohydrates.  Determine the effects of a high consumption of different food sources containing simple sugars with links to dietary disorders such as type 2 diabetes.  Describe the food sources of insoluble and soluble fibre and their roles in the body. |  |
| Use the nutrition information panels and ingredient lists of different products to compare the total carbohydrate and the simple sugar content to determine the best option for consumption. |  |
| Investigate the changing health of individuals through the use of prebiotics and the link to different types of insoluble and soluble fibre. |  |
| Water and other fluids   * sources and functions of water and other fluids in the diet * benefits derived from consuming fluids other than water * factors that affect hydration levels * the effects of dehydration. | Research food sources from different food groups that are high in water content as an alternative to water.  Explain the essential role of water.  Determine the adverse effects of a deficiency of water in the diet. |  |
| Investigate the application and limitation of hydration in sport. |  |
| Micronutrients (vitamins and minerals) are required by the body for good health and for the prevention of many diet-related disorders.   * The difference between vitamins and minerals.   *Vitamins*   * the differences between fat-soluble and water-soluble vitamins * the functions of the following vitamins * vitamins B1, B2, and B3, for metabolism of macronutrients * folate, vitamin B12, vitamin C, and vitamin D, which are all associated with health issues and deficiencies in Australia * Vitamin K and its link to the microbiome.   *Minerals*   * the functions of the following minerals * sodium * iron * calcium * potassium * iodine. * factors affecting bioavailability and absorption of minerals * haem iron vs non‑haem iron * the interrelationship of different micronutrients * promoting absorption of micronutrients * vitamin C and non-haem iron * inhibiting absorption of micronutrients * calcium * iron. | Compare fat-soluble and water-soluble vitamins, with respect to absorption, transport, storage, toxicity, and excretion.  Describe how particular vitamins can cause adverse effects in the body and can be considered toxic when consumed above their upper limit.  Explain how the bioavailability of different nutrients can be affected when consuming different food sources high in specific vitamins.  Explain how vitamins and minerals can have a similar role and function in the body.  Describe the functions and food sources for a specific vitamin or mineral.  Determine the different food sources of haem and non‑haem iron.  Explore how calcium inhibits iron absorption.  Debate the role of dietary supplements of folate in a balanced diet. |  |
| Investigate different cooking methods (e.g. boiling, steaming, microwaving, frying) to determine the effects on different vitamins. |  |
| Discuss the potential social impacts of deficiencies of vitamins, such as nyctalopia (night blindness), osteoporosis, pellagra, spina bifida, anaemia, rickets, and scurvy, and the effects of these conditions on different populations or groups.  Examine the way caffeine (including associated phytates and oxalates) inhibits calcium absorption and the impacts of increasing caffeine consumption. |  |
| Imbalance of nutrient intake is likely to cause diet-related disorders.   * Diet-related health disorders include: * the consequences of overnutrition (obesity, cardiovascular disease, type 2 diabetes, hypertensions) * the consequences of undernutrition (constipation/diverticulitis, anaemia, osteoporosis, rickets, scurvy, spina bifida). * The role of diet and lifestyle in the prevention, control, or reversal of such disorders. | Explore different examples of deficiencies of minerals, including osteoporosis and anaemia in different populations.  In groups, investigate a diet-related health disorder using the key headings below:   * definition * risk factors/causes * nutrition * lifestyle * genetic * signs/symptoms * strategies to manage and improve through nutrition and lifestyle.   In groups, explore ways to modify recipes/diet for any of the diet-related disorders and justify changes. |  |
| Compare the nutrition benefits of different popular diets.  Investigate the making of a health biscuit for food drops in times of famine (assess for nutrient value). |  |
| Using articles, explore contemporary developments in relation to diet-related disorders, such as the rise in scurvy, the increase in bowel cancer among young people, or the increase in vitamin D deficiencies.  Discuss the benefits and ethical considerations associated with low-calorie sweeteners and cardiovascular disease. |  |
| Nutrition through the life cycle.   * Specific nutrition needs and energy requirements for the different stages of the life cycle. * Factors that determine an individual’s physiological need for nutrients (age, gender, body size, activity level). | In groups, differentiate the nutrition needs across the lifespan of an individual. |  |
| For a specific individual, investigate their food and beverage consumption over 24 hours and analyse its nutrition content. Suggest and justify appropriate changes, where required. |  |
| Investigate the applications and limitations of genetic analysis on nutrition health. |  |

Topic 2: Health promotion and emerging trends

Nutrition health promotion and food trends are continually evolving. Pressures from stakeholders, such as government bodies and social media, influence food choices. Students evaluate factors influencing food choices, including the labelling of foods and its implications for consumer health. Along with considering and interpreting endorsed nutrition educational programs and tools, students analyse and evaluate data related to scenarios or case studies and apply this data to current situations.

Students:

* understand the labelling of foods and its implications for health
* consider and interpret endorsed nutrition educational programs and tools
* evaluate factors influencing food choices
* analyse and evaluate data, scenarios, or case studies.

| Nutrition Understanding | Possible contexts |  |
| --- | --- | --- |
| In Australia, the sale of food is regulated and consumers are protected by government legislation and regulation.   * the role of Food Standards Australia New Zealand (FSANZ) in regulation of food production and consumer safety * food-borne illnesses (botulism, listeria, *E. coli*, and salmonella) from food contamination and how these are prevented * food processing techniques: freezing, canning/bottling and pasteurisation * advantages and disadvantages of metal, plastic, paper, glass and active packaging. * FSANZ — additives, including emulsifiers, antioxidants, artificial colours, and sweeteners * FSANZ — mandatory fortification (specifics — folate, thiamine, iodine, vitamin D) * 12 mandatory food-labelling requirements * nutrition value per 100 grams to compare food products and help consumers make informed decisions * nutrition composition of food using nutrition tables or programs. | Compare different foods using their nutrition information panels.  Using nutrition information panels, calculate the energy value and percentage of nutrient groups for various foods.  Use food labels to compare and analyse the nutrition value of the same food products from different manufacturers.  Predict what the benefits of compulsory and improved nutrition labelling will be for consumers, society, and the health sector.  Use data or articles to discuss food-borne illnesses.  Research the pros and cons of two food-processing techniques, such as preservation (e.g. freezing, canning), pasteurisation, and fortification. |  |
| Select three foods and identify possible situations where the food could be contaminated by listeria, *E. coli*, or salmonella.  Act as a local health official in a mock food-poisoning case and interpret information presented to determine the food and pathogen most likely to be responsible.  Conduct an experiment to measure microbe development on specific foods under varying conditions. |  |
| Investigate whether the branding of milk alternatives as ‘milk’ is valid?  Evaluate the claims about superfoods. |  |
| Diagnostic tools assist individuals and health professionals in evaluating health and diet.   * body mass index (BMI) * the limitations, advantages, and disadvantages of using BMI compared to one of the following: * waist circumference * waist-to-hip ratio * weight-for-height tables * blood analysis * nutrient reference values (NRVs). | Calculate your BMI and compare it with the Australian Government Department of Health BMI chart for adults.  Discuss the usefulness of diagnostic tools in evaluating an individual’s health and diet.  Investigate the validity of an individual’s interpretation of the data from diagnostic tools in the absence of a qualified practitioner.  Evaluate BMI as an effective diagnostic tool.  Review the BMI of AFL footballers (or other sportspersons) to evaluate BMI as a diagnostic tool. |  |
| For a group of individuals, use the following diagnostic tools to assess and compare their health:   * BMI * waist-to-hip ratio * waist circumference * weight-for-height tables. |  |
| Educational aids are available to help improve individuals’ dietary patterns and health.   * importance of government dietary guidelines, such as the *Australian dietary guidelines* and the Australian Guide to Healthy Eating * social marketing campaigns and programs about adopting healthy nutrition behaviour * food models (e.g. the Canadian model compared to the Australian Guide to Healthy Eating or the Aboriginal and Torres Strait Islander Guide to Healthy Eating). | Using the *Australian dietary guidelines*, evaluate diets to analyse and make recommendations.  Evaluate the effectiveness of the *Australian dietary guidelines* in promoting healthy food choices and reducing the risk of diet-related disorders.  Compare social marketing campaigns in their effectiveness in improving the health status of communities. |  |
| Conduct surveys to determine the breakfast intake of students and compare to the *Australian dietary guidelines* for adolescents. |  |
| Explore how the *Australian dietary guidelines* have been (or could be) modified in the light of new nutrition understanding and evidence. |  |
| Food sociology deals with understanding the factors that affect food selection by individuals.  Factors affecting food selection include:   * sensory reactions to food * psychological influences * social influences * food regulation * marketing and advertising, including social media and celebrity endorsements * food affordability and food availability. | Compile a list of the factors that influence people’s food choices under the headings of internal and external factors. Consider which factors may lead to poor food choice resulting in compromised health status.  Visit a TAFE or university campus and experience their sensory analysis laboratory to learn the principal techniques of sensory evaluation.  Compare the food choices of vegan, vegetarian, and non-vegetarian consumers and explain the values and beliefs that underlie their food choices.  Critique how advertising affects food selection. |  |
| Conduct food sensory-analysis tests and compile the food preferences of individuals.  Compare the appearance, flavour, and taste of different versions of the same food product, e.g. full-fat cheese compared to low-fat cheese; **or** full-cream milk compared to skim or UHT milk. |  |
| Investigate the nutrition value of traditional Aboriginal foods, how these contribute to a healthy diet, and how this knowledge contributes to the global understandings of nutrition. |  |

Topic 3: Sustainable food systems

Students explore new foods and food systems. This includes investigating consumer demands, environmental changes, supply, novel foods, consumption rates, and research and development. Students look critically and creatively at food innovations and production and the ethical and sustainable impacts of these. Students understand the impact of the food system on the environment, explore contemporary developments in the food system, and understand the implications of food wastage and contamination on sustainability.

Students:

* understand the different components of the food system
* understand the impact of the food system on the environment
* explore contemporary developments in the food system
* understand the implications of food wastage on sustainability
* analyse and evaluate data or scenarios.

| Nutrition Understanding | Possible contexts |  |
| --- | --- | --- |
| The food system involves the stages of production, distribution, and research and development. Each stage affects the nutrition quality and accessibility of the food product.  *Production and distribution*   * the impact of food production methods * monoculture * soil quality * land availability * use of fertilizers and pesticides * livestock farming * land availability * soil quality * use of antibiotics * organic farming * intercropping/crop rotation/mixed farming * crop yield * biodiversity * aquaculture * eutrophication * water quality and contamination (excess fish feed, antibiotics, faeces, disease) * commercial fishing * biodiversity * the impact of food production on * global warming * food distribution and mileage * water availability * food wastage * the impact of food packaging materials on * natural resources * oil * mining * deforestation * environment and pollution * plastics and microplastics * habitats * food waste * compostable packaging * landfill. * strategies that consumers, producers and retailers can do to reduce food wastage and its impact on the environment. | Using data, compare organic foods with industrial foods for nutrition and chemical residue.  Investigate one of the following food production trends: specialisation, mechanisation, the rise in chemical use, consolidation, and market concentration.  Compare industrial food production of high-level protein sources, e.g. chickens raised for meat, laying hens, pigs, beef cattle, soybeans chickpeas.  Compare the carbon footprint of processed and unprocessed food products.  Research reasons for food to be transported long distances, e.g. seasonality geographical availability, population density.  Using data, identify how much food is wasted in landfill, and its impact on methane gas production.  Investigate ways of reducing food waste, by considering waste at various points, such as:   * before harvest * after harvest * processing * distribution * restaurants and other food outlets * retail, including supermarkets, farmers’ markets * domestic consumption. |  |
| Compare and contrast wild-caught seafood to seafood from aquaculture.  Compare two waste-reduction programs for food and evaluate their effectiveness. |  |
| Investigate ways in which reducing meat consumption could contribute to environmental sustainability.  Investigate the health issues associated with microplastics in food.  Investigate how food trends can cause environmental damage.  Investigate ways that specific diets and lifestyle practices could reduce the volume of food waste. |  |
| *Research and development*  The role of research and development in reducing the impact of food production on the environment and enhancing food security by increasing food availability and meeting nutritional needs of society.   * vertical farming * digital farming * genetically modified organisms (GMOs) * entomophagy * algae * lab grown meat * 3D printed food. | Research novel food descriptors by FSANZ and discuss the impact for the future. |  |
| Investigate the development of vertical farming and its impact for the future.  Create a healthy alternative to an existing food product.  Compare two waste-reduction programs for food and evaluate their effectiveness |  |
| Discuss the potential impact of 3D printing of food and the opportunities and limitations it provides for future food production. |  |

Assessment scope and requirements

All Stage 2 subjects have a school assessment component and an external assessment component.

Evidence of learning

The following assessment types enable students to demonstrate their learning in Stage 2 Nutrition:

School assessment (70%)

* Assessment Type 1: Investigations Folio (30%)
* Assessment Type 2: Skills and Applications Tasks (40%)

External assessment (30%)

* Assessment Type 3: Examination.

Students provide evidence of their learning through six assessments, including the external assessment component. Students complete:

* one design practical investigation
* one investigation with a focus on science as a human endeavor
* three skills and applications tasks, one of which must be a case study
* one examination.

Assessment design criteria

The assessment design criteria are based on the learning requirements and are used by:

* teachers to clarify for the student what they need to learn
* teachers and assessors to design opportunities for students to provide evidence of their learning at the highest possible level of achievement.

The assessment design criteria consist of specific features that:

* students should demonstrate in their learning
* teachers and assessors look for as evidence that students have met the learning requirement.

For this subject the assessment design criteria are:

* investigation, analysis and evaluation
* knowledge and application.

The specific features of these criteria are described below.

The set of assessments, as a whole, must give students opportunities to demonstrate each of the specific features by the completion of study of the subject.

Investigation, Analysis, and Evaluation

The specific features are as follows:

IAE1 Design and conduct of investigations using appropriate methodologies.

IAE2 Obtaining, recording, and displaying findings of investigations, using appropriate conventions and formats.

IAE3 Analysis and interpretation of data and/or information to justify conclusions.

IAE4 Evaluation of methodologies and/or research processes and their effect on data or findings.

Knowledge and Understanding

The specific features are as follows:

KA1 Demonstration of knowledge and understanding of nutrition concepts.

KA2 Application of nutrition concepts in familiar and unfamiliar contexts.

KA3 Exploration and understanding of the relationship between nutrition science and society.

KA4 Communication of nutrition concepts and nutrition literacy and numeracy.

School assessment

Assessment Type 1: Investigations Folio (30%)

Students complete two tasks:

* one design practical investigation
* one investigation with a focus on science as a human endeavor.

Students inquire into aspects of nutrition through practical discovery and data analysis, and/or by selecting, analysing, and interpreting information.

Design Practical Investigation

Students individually design an investigation to demonstrate their science inquiry skills by:

* designing an appropriate method for investigation with justification
* formulating a hypothesis
* identifying appropriate equipment, apparatus, and techniques
* identifying variables
* constructing a suitable table to record data.
* communicating knowledge and understanding of concepts.

The design practical investigation should be up to a maximum of 3 sides of an A4 page. This evidence must be attached to the practical report.

Practical investigations conducted can be from:

* the individually designed practical investigation
* another class member’s design practical investigation
* a teacher selected practical investigation.

Practical investigations can be conducted individually or collaboratively. Students present an individual report.

A practical investigation report must include:

* introduction with relevant nutrition concepts, a hypothesis and variables
* materials/apparatus used in an experiment (e.g. as a table or image)
* the method that was implemented
* identification and management of safety and/or ethical risks
* results, including table(s) and/or graph(s)
* analysis of results, including identifying trends and linking results to concepts
* evaluation of procedures and their effect on data, and identifying sources of uncertainty
* conclusion, with justification.

Suggested formats for presentation of a practical investigation report include:

* a written report
* an oral presentation
* a multimodal product.

The report should be a maximum of 1500 words if written, or a maximum of 9 minutes for an oral presentation, or the equivalent in multimodal form.

Only the following sections of the conducted practical investigation report are included in the word count:

* introduction
* analysis of results
* evaluation of procedures
* conclusion and justification.

Science as a Human Endeavour Investigation

Students individually investigate a contemporary example of how nutrition science interacts with society. This may focus on one or more of the key concepts of science as a human endeavour described on pages 10 and 11, and may draw on a context suggested in the topics or relate to a new context.

Students select and explore a recent discovery, innovation, issue, or advance linked to one of the topics in Stage 2 Nutrition. They analyse and synthesise information from different sources to explain the science relevant to the focus of their investigation, show its connections to science as a human endeavour, and develop a conclusion.

Possible starting points for the investigation could include, for example:

* the announcement of a discovery in the field of nutrition science
* an expert’s point of view on a controversial innovation
* a TED talk based on a nutrition development
* an article from a scientific publication (e.g. *Cosmos*, *Nutridate*)
* public concern about an issue that has environmental, social, economic, or political implications
* changes in government funding for nutrition-related purposes, e.g. for scientific research into biotechnology, conservation planning, hormone use in food production, biosecurity, water quality, disease control, health
* innovative directions in research.

Based on their investigation, students prepare a scientific report, which must include the use of scientific terminology and:

* an introduction to identify the focus of the investigation and the key concept(s) of science as a human endeavour that it links to
* relevant nutrition concepts or background
* an explanation of how the focus of the investigation illustrates the interaction between science and society, including a discussion of the potential impact of the focus of the investigation, e.g. further development, effect on quality of life, environmental implications, economic impact, intrinsic interest
* a conclusion
* citations and referencing.

The report could take the form of, for example:

* an article for a scientific publication
* an oral or multimodal scientific presentation

The report should be a maximum of 1500 words if written, or a maximum of 9 minutes for an oral presentation, or the equivalent in multimodal form.

For this assessment type, students provide evidence of their learning in relation to the following assessment design criteria:

* investigation, analysis, and evaluation
* knowledge and application.

Assessment Type 2: Skills and Applications Tasks (40%)

Students complete three skills and applications tasks, one of which must be a case study.

Skills and applications tasks allow students to provide evidence of their learning in tasks that may:

* be applied, analytical, and/or interpretative
* pose problems in new and familiar contexts
* be individual or collaborative, depending on task design.

The skills and applications tasks should be designed to enable students to apply their science inquiry skills, and demonstrate knowledge and understanding of key nutrition concepts and learning. Problems and scenarios should be set in a relevant context, which may be practical, social, or environmental. For collaborative tasks, students present an individual report.

Case Study

Students investigate a patient/client case study in which they analyse and/or evaluate nutrition data. This could be set by the teacher or individually planned.

Students may, for example, analyse and evaluate one or more of the following data sets:

* personal history
* general information about the subject, including age, gender, ethnicity, economic data, psychological factors, religion
* medical/health history
* patient and family medical/health history, allergies, or intolerances
* anthropometrics
* height, weight, body mass index (BMI), basal metabolic rate (BMR)
* food/nutrition intake
* for example, intake of food and beverages over 24 hours with specificity of size/quantity and brands
* knowledge, beliefs, and attitudes related to food and health
* physical activity history
* wellness case study
* for example, assessing the impacts of cooking, exercising, and eating together as teams or communities on wellness, or the impact of healthy eating interventions on wellness
* secondary diagnoses
* any other medical issues.

A case study may also include representation of data such as nutrients, and comparisons of findings to analyse and evaluate.

Students may demonstrate their critical thinking by:

* analysing specific nutrients, macronutrients, and/or micronutrients
* representing, analysing, and interpreting data
* evaluating procedures and considering their impact on results
* drawing conclusions
* communicating knowledge and understanding of concepts
* comparing nutrient intake to the five food groups
* identifying undernutrition or overnutrition disorders that the subject may be at risk of based on the findings
* suggesting modifications to the subject’s food and beverage intake to include suitable servings from each of the food groups to meet their nutrition needs
* referring to the *Australian dietary guidelines* and the Australian Guide to Healthy Eating
* making a recommendation with justification for future healthier options.

The case study could take the form of, for example:

* an article for a scientific publication
* a report
* a video
* an oral or multimodal scientific presentation.

The case study should be a maximum of 1500 words if written, or a maximum of 9 minutes for an oral presentation, or the equivalent in multimodal form.

Other Skills and Applications Task

Besides case studies, skills and applications tasks may include, for example:

* developing simulations
* practical and/or graphical skills
* a multimodal product
* an oral presentation
* participation in a debate
* an extended response
* responses to short-answer questions
* a response to science in the media.

A skills and applications task may involve, for example:

* solving problems
* designing an investigation to test a hypothesis or investigable question
* considering different scenarios in which to apply knowledge and understanding of graphing, tabulating, and/or analysing data
* evaluating procedures and identifying their limitations
* formulating and justifying conclusions
* representing information diagrammatically or graphically
* using nutrition terms, conventions, and notations.

A student’s evidence for other skills and applications tasks should each be a maximum of 1000 words if written, or a maximum of 6 minutes for an oral presentation, or the equivalent in multimodal form.

For this assessment type, students provide evidence of their learning in relation to the following assessment design criteria:

* investigation, analysis, and evaluation
* knowledge and application.

External assessment

Assessment Type 3: Examination (30%)

Students undertake one 130-minute examination.

Stage 2 science inquiry skills and nutrition understanding will be assessed from all three topics studied:

* Principles of nutrition, physiology, and health
* Health promotion and emerging trends
* Sustainable food systems.

Questions will:

* include case studies and/or scenarios
* involve application of knowledge and skills to different contexts
* require analysis and interpretation of data or information.

All specific features of the assessment design criteria for this subject may be assessed in the external examination.

Performance standards

The performance standards describe five levels of achievement, A to E.

Each level of achievement describes the knowledge, skills, and understanding that teachers and assessors refer to in deciding how well students have demonstrated their learning on the basis of the evidence provided.

During the teaching and learning program the teacher gives students feedback on their learning, with reference to the performance standards.

The student’s school assessment and external assessment are combined for a final result, which is reported as a grade between A and E.

Performance Standards for Stage 2 Nutrition

| - | Investigation, Analysis, and Evaluation | Knowledge and Application |
| --- | --- | --- |
| A | Critically designs and conducts investigations using appropriate methodologies.  Obtains, records, and displays findings of investigations, using appropriate conventions and formats accurately and highly effectively.  Systematically analyses and interprets data and/or information to justify logical conclusions.  Critically and logically evaluates methodologies and/or research processes and their effect on data or findings. | Demonstrates deep and broad knowledge and understanding of a range of nutrition concepts.  Applies nutrition concepts highly effectively in familiar and unfamiliar contexts  Critically explores and understands the relationship between nutrition science and society.  Coherently and clearly communicates nutrition concepts and nutrition literacy and numeracy. |
| B | Logically designs and conducts investigations using appropriate methodologies.  Obtains, records, and displays findings of investigations, using appropriate conventions and formats mostly accurately and effectively.  Analyses and interprets data and/or information to justify reasonable conclusions.  Logically evaluates methodologies and/or research processes and their effect on data or findings. | Demonstrates some depth and breadth of knowledge and understanding of a range of nutrition concepts.  Applies nutrition concepts mostly effectively in familiar and unfamiliar contexts.  Logically explores and understands the relationship between nutrition science and society.  Mostly coherently and clearly communicates nutrition concepts and nutrition literacy and numeracy. |
| C | Designs and conducts investigations using appropriate clear methodologies.  Obtains, records, and displays findings of investigations, using appropriate conventions and formats, with some errors but generally accurately and effectively.  Interprets data and/or information to justify generally appropriate conclusions.  Evaluates methodologies and/or research processes and some of their effect on data or findings. | Demonstrates knowledge and understanding of a general range of nutrition concepts.  Applies nutrition concepts generally effectively in familiar and unfamiliar contexts.  Explores and understands aspects of the relationship between nutrition science and society.  Generally coherently and clearly communicates nutrition concepts and nutrition literacy and numeracy. |
| D | Prepares and conducts investigations using some appropriate methodologies.  Obtains, records, and displays findings of investigations, using appropriate conventions and formats inconsistently, with occasional accuracy and effectiveness.  Describes data and/or information to formulate basic conclusions.  Attempts to evaluate methodologies and/or research processes and suggest an effect on data or findings. | Demonstrates some basic knowledge and partial understanding of nutrition concepts.  Applies some nutrition concepts in familiar contexts.  Partially explores and recognises aspects of the relationship between nutrition science and society.  Clearly communicates some nutrition concepts and nutrition literacy and numeracy. |
| E | Attempts to prepare and conduct investigations using simple methodologies.  Attempts to record and represent some data, with limited accuracy or effectiveness.  Attempts to describe data and/or information and formulates a simple conclusion.  Acknowledges that methodologies and/or research processes affect data or findings. | Demonstrates limited recognition and awareness of nutrition concepts.  Attempted to apply nutrition concepts in familiar contexts.  Attempts to explore and identify an aspect of the relationship between nutrition science and society.  Attempts to communicate nutrition concepts and nutrition literacy and numeracy. |

Assessment integrity

OFFICIAL

The SACE Assuring Assessment Integrity Policy outlines the principles and processes that teachers and assessors follow to assure the integrity of student assessments. This policy is available on the SACE website (www.sace.sa.edu.au) as part of the SACE Policy Framework.

The SACE Board uses a range of quality assurance processes so that the grades awarded for student achievement, in both the school assessment and the external assessment, are applied consistently and fairly against the performance standards for a subject, and are comparable across all schools.

Information and guidelines on quality assurance in assessment at Stage 2 are available on the SACE website (www.sace.sa.edu.au).

Support materials

Subject-specific advice

Online support materials are provided for each subject and updated regularly on the SACE website (www.sace.sa.edu.au). Examples of support materials are sample learning and assessment plans, annotated assessment tasks, annotated student responses, and recommended resource materials.

Advice on ethical study and research

Advice for students and teachers on ethical study and research practices is available in the guidelines on the ethical conduct of research in the SACE, which are on the SACE website (www.sace.sa.edu.au).