

# Nutrition and Health, Grade 12

University Preparation

HFA4U

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This course examines the relationships between food, energy balance, and nutritional status; the nutritional needs of individuals at different stages of life; and the role of nutrition in health and disease. Students will evaluate nutrition-related trends and will determine how food choices can promote food security and environmental responsibility. Students will learn about healthy eating, expand their repertoire of food-preparation techniques, and develop their social science research skills by investigating issues related to nutrition and health.

**Prerequisite:** Any university or university/college preparation course in social sciences and humanities, English, or Canadian and world studies

# A. RESEARCH AND INQUIRY SKILLS

## OVERALL EXPECTATIONS

Throughout this course, students will:

- A1. Exploring:** explore topics related to nutrition and health, and formulate questions to guide their research;
- A2. Investigating:** create research plans, and locate and select information relevant to their chosen topics, using appropriate social science research and inquiry methods;
- A3. Processing Information:** assess, record, analyse, and synthesize information gathered through research and inquiry;
- A4. Communicating and Reflecting:** communicate the results of their research and inquiry clearly and effectively, and reflect on and evaluate their research, inquiry, and communication skills.

## SPECIFIC EXPECTATIONS

### A1. Exploring

Throughout this course, students will:

- A1.1** explore a variety of topics related to nutrition and health (*e.g., food security, factors affecting metabolism*) to identify topics for research and inquiry
- A1.2** identify key concepts (*e.g., through discussion, brainstorming, use of visual organizers*) related to their selected topics
- A1.3** formulate effective questions to guide their research and inquiry

**Teacher prompt:** “If you were researching the extent to which different communities have access to safe drinking water in Ontario, why might it be useful to compare access to safe water before and after the contamination of the Walkerton water supply in 2000?”

### A2. Investigating

Throughout this course, students will:

- A2.1** create appropriate research plans to investigate their selected topics (*e.g., outline purpose and method; identify sources of information; develop research tools such as surveys or questionnaires*),

ensuring that their plans follow guidelines for ethical research

**Teacher prompts:** “What are some good places to locate reliable sources of information?” “For which purposes might websites such as Wikipedia be adequate sources of information? What are the risks of using websites such as Wikipedia?” “What criteria should be used to ensure that you are following ethical guidelines when you develop surveys or interviews?”

- A2.2** locate and select information relevant to their investigations from a variety of primary sources (*e.g., interviews, surveys, questionnaires, observations, field research, research based on primary data in a peer-reviewed journal, data sets from Statistics Canada*) and secondary sources (*e.g., book reviews, literature reviews, textbooks, websites, advertisements, brochures, newspaper and magazine articles*)

**Teacher prompts:** “What is the difference between primary and secondary sources in social sciences?” “Why is it important to base your research on a variety of sources rather than just one or two?”

- A2.3** based on preliminary research, for each investigation formulate a hypothesis, thesis statement, or research question, and use it to focus their research

### A3. Processing Information

Throughout this course, students will:

**A3.1** assess various aspects of information gathered from primary and secondary sources (e.g., accuracy, relevance, reliability, inherent values and bias, voice)

**Teacher prompts:** “What strategies can you use to determine the relevance of the information you have gathered?” “If two information sources contradict each other, how might you determine which is more reliable?” “What values are embedded in the information sources?” “Whose voices are represented and whose are absent?” “Whose interests are advanced if you believe the main message of this source?” “What is your own personal connection to the research, and how does this affect your interpretation of the information gathered?”

**A3.2** record and organize information and key ideas using a variety of formats (e.g., journals, logs, report outlines, notes, graphic organizers, audio/visual/digital records)

**A3.3** analyse and interpret research information (e.g., compare results of surveys and interviews; determine whether common themes arise in different sources)

**A3.4** demonstrate academic honesty by documenting the sources of all information generated through research

**A3.5** synthesize findings and formulate conclusions (e.g., determine whether their results support or contradict their hypothesis; weigh and connect

information to determine the answer to their research question; assess the extent to which their results may be affected by “confounding variables” – i.e., factors not included in their research design)

### A4. Communicating and Reflecting

Throughout this course, students will:

**A4.1** use an appropriate format (e.g., oral presentation, written research report, poster, multimedia presentation, web page) to communicate the results of their research and inquiry effectively for a specific purpose and audience

**A4.2** use terms relating to nutrition and health correctly (e.g., macronutrient, micronutrient, nutrient deficiency, nutrient retention, food security, water potability, functional food)

**A4.3** clearly communicate the results of their inquiries (e.g., write clearly, organize ideas logically, use language conventions properly), and follow APA conventions for acknowledging sources (e.g., generate a reference list in APA style, use in-text author-date citations)

**A4.4** demonstrate an understanding of the general research process by reflecting on and evaluating their own research, inquiry, and communication skills

**Teacher prompts:** “How might the research methods you used have affected the results you obtained?” “What steps might you take to enhance your research/inquiry skills?”

## B. NUTRITION AND HEALTH

### OVERALL EXPECTATIONS

By the end of this course, students will:

- B1. Nutrients:** demonstrate an understanding of nutrients and their connection to physical health;
- B2. Food Guides:** demonstrate an understanding of Canada’s Food Guide and its role in promoting physical health;
- B3. Energy Balance:** demonstrate an understanding of the physical processes involved in maintaining energy balance;
- B4. Nutritional Status:** demonstrate an understanding of their nutrient intake and of factors that affect the nutritional status of individuals and groups.

### SPECIFIC EXPECTATIONS

#### B1. Nutrients

By the end of this course, students will:

- B1.1** identify the sources and explain the functions of macronutrients (i.e., carbohydrates, fats, proteins), micronutrients (i.e., vitamins, minerals), and water

**Teacher prompts:** “Why does the body need protein every day?” “How can plant sources be effectively combined to make complementary proteins?”

- B1.2** describe the causes and symptoms of nutrient deficiencies (e.g., rickets, pellagra, goitre, anaemia, osteoporosis, scurvy, kwashiorkor, marasmus, beriberi) and excesses (e.g., iron toxicity, fluorosis)

**Teacher prompt:** “Why might iron toxicity occur from taking mineral supplements but not from eating iron-rich foods?”

- B1.3** analyse specific foods to determine their nutrient content, using available food and nutrition information (e.g., Nutrition Facts tables, food company nutrition information, nutrient-values databases, information provided by health and nutrition professionals)

**Teacher prompt:** “Why might different sources of information about the nutritional content of food products provide contradictory data? How might knowing the source of the information help you decide what information is reliable and what is not?”

- B1.4** plan and prepare a food item or items to ensure optimal nutrient content and retention (e.g., choose nutrient-dense foods; steam rather than boil vegetables)

#### B2. Food Guides

By the end of this course, students will:

- B2.1** explain why Canada’s Food Guide has changed over time (e.g., in response to new scientific information, greater diversity in the Canadian population, increased availability of internationally marketed crops, lobbying by food-marketing boards)

**Teacher prompt:** “Considering the results of recent nutrition research, what recommendations do you think will be incorporated into the next version of Canada’s Food Guide?”

- B2.2** outline the main nutrients found in each of the food groups in Canada’s Food Guide (e.g., carbohydrates in the Grain Products group, protein in the Meat and Alternatives and Milk and Alternatives groups)

**Teacher prompt:** “From which food group would people usually get vitamin D? For somebody who is not able to eat all of the foods in this food group, how else might he or she get adequate amounts of vitamin D?”

- B2.3** explain how various research findings support the recommendations and guidelines in Canada’s Food Guide (e.g., the recommendation

to choose fruits and vegetables rather than juice is based on the research finding that whole fruits and vegetables contain fibre, which juice does not)

**Teacher prompt:** “What is the research basis behind the recommendation in Canada’s Food Guide to eat at least two servings of fish each week?”

- B2.4** explain the differences in the underlying concepts and recommendations of food guides from other countries (e.g., *Dietary Guidelines for Americans*, *Mediterranean Food Guide*, *Chinese Food Guide*) and food guides designed for special groups (e.g., *vegans*, *vegetarians*, *diabetics*)

**Teacher prompts:** “What are the implications of the fact that fruits and vegetables are separate food groups in American food guidelines, but one group in Canada’s Food Guide?” “What recommendations are made about oils in Canada’s Food Guide and in the Dietary Guidelines for Americans?”

- B2.5** analyse a recipe and modify it as necessary to reflect specific recommendations in Canada’s Food Guide (e.g., *reduce fat and sodium*; use *whole grains*, *dark green or orange vegetables*, *beans or lentils*)

### B3. Energy Balance

By the end of this course, students will:

- B3.1** explain the processes of and factors affecting the digestion, absorption, and metabolism of food

**Teacher prompts:** “How are nutrients absorbed by the body?” “How does stress affect digestion?”

- B3.2** analyse foods to identify their macronutrient content (i.e., the percentage of calories from various types of nutrients)

**Teacher prompt:** “What ratio of macronutrients is ideal? How does your typical daily macronutrient ratio compare to the ideal?”

- B3.3** explain the concept of energy balance, and describe how energy balance is achieved (e.g., *by changing the volume and types of food eaten*; *by changing the type, duration, or intensity of exercise*)

- B3.4** analyse and interpret data to determine how various factors affect calorie expenditure (e.g., *data about duration and intensity of exercise*, *body composition*, *basal metabolic rate*, *energy required for various forms of activity*)

**Teacher prompts:** “How does basal metabolic rate (BMR) change throughout the lifespan?” “How does the average daily caloric expenditure of a sixteen-year-old male compare to that of a seventy-year-old male?”

### B4. Nutritional Status

By the end of this course, students will:

- B4.1** analyse their own nutrient intake with reference to current Canadian guidelines (e.g., *Dietary Reference Intakes*)

**Teacher prompt:** “How does your daily intake of iron compare to the estimated average requirement (EAR) and the recommended daily allowance (RDA) of iron on the Canadian Dietary Reference Intakes? Why is the RDA a better point of comparison than the EAR?”

- B4.2** compare their own nutrient intake with that of various population groups in Canada

**Teacher prompts:** “How does your nutrient intake compare to that of an average teenager living in another part of Canada?” “How does your nutrient intake compare to that of an average eighty-year-old in Canada?” “What factors should you take into account when comparing nutritional status?”

- B4.3** explain how various factors (e.g., *genetics*, *deterioration of infrastructure*, *environmental governance*, *trade embargos*, *war*, *natural disasters*) affect the nutritional status of specific population groups in Canada and around the world

**Teacher prompts:** “What factors have contributed to limited access to fresh water in such rural communities as Walkerton, Ontario, and the Kashechewan First Nation?” “How might the U.S. trade embargo on Cuba affect the nutritional status of the Cuban people?” “How might nutritional status profiles be used to help improve the nutritional status of particular groups? In what ways might such profiles be considered discriminatory?” “In what ways has access to traditional foods been restricted for many Aboriginal people in Canada? What are some of the specific effects of this restriction on their nutritional status?”

- B4.4** plan and prepare a food item or items to address a specific nutritional deficiency in a typical Canadian diet (e.g., *prepare a high-fibre snack to address a lack of dietary fibre*)

## C. EATING PATTERNS AND TRENDS

### OVERALL EXPECTATIONS

By the end of this course, students will:

- C1. Nutrition throughout the Lifespan:** demonstrate an understanding of food- and nutrition-related issues at different stages in the lifespan;
- C2. Nutrition and Disease:** demonstrate an understanding of the relationships between nutrition, health, and disease;
- C3. Trends and Patterns in Food and Nutrition:** demonstrate an understanding of current Canadian trends and patterns in nutritional guidelines and in food production and consumption.

### SPECIFIC EXPECTATIONS

#### C1. Nutrition throughout the Lifespan

By the end of this course, students will:

- C1.1** analyse developments throughout the lifespan (*e.g., during pre-pregnancy, pregnancy, lactation, infancy, toddler and preschool years, elementary school years, pre-adolescence, adolescence, adulthood, senior years*) to determine how they affect nutritional needs  
*Teacher prompt:* “What are some specific nutritional needs associated with adolescence? How can these needs be addressed with proper food choices?”
- C1.2** explain how various influences throughout the lifespan (*e.g., familial, social, emotional, cultural, religious, economic, ethical, psychological*) can affect people’s food choices  
*Teacher prompts:* “Why might conflict develop in some families when the children adopt different eating patterns than the parents?” “How do friends influence each other’s food choices?” “How do food choices related to, for example, candy, beverages, or vegetables reflect an individual’s self-identity at any given time in the person’s development?”
- C1.3** explain why particular food and nutrition products are appropriate or popular at various stages of the lifespan (*e.g., single-serving products, baby foods, meal-replacement drinks*)  
*Teacher prompt:* “What specific foods are currently being marketed to appeal to teenagers? To the elderly?”

- C1.4** plan and prepare a food item or items appropriate to the nutritional needs of people at a specific stage of the lifespan

#### C2. Nutrition and Disease

By the end of this course, students will:

- C2.1** explain why certain eating practices are associated with the prevention and management of particular health conditions (*e.g., allergies, diabetes, cardiovascular disease, osteoporosis, kidney disease*)  
*Teacher prompts:* “How can a person’s diet in childhood affect his or her likelihood of developing osteoporosis later in life?” “How would the diet of someone who is lactose intolerant differ from the diet of someone who has a milk allergy?”
- C2.2** explain the relationship between particular social and emotional conditions (*e.g., busy schedules, expectations related to body shape, stress, scarcity of resources*) and unhealthy eating patterns that can contribute to illness and disease
- C2.3** assess the role of various factors (*e.g., heredity/genetics, socio-economic status, geography, lifestyle, activity level*) in nutrition-related illnesses and health conditions  
*Teacher prompts:* “How are the contributing factors of nutrition-related illnesses interrelated?” “How does childhood poverty affect people’s long-term health outcomes?” “How do geography and socio-economic status affect people’s access to nutrition and their susceptibility to disease?”

**C2.4** analyse how specific illnesses, diseases, or medical treatments (*e.g., diabetes, HIV/AIDS, chemotherapy, certain pharmaceutical drugs or drug combinations*) affect people's nutritional needs

**Teacher prompts:** "How does diabetes affect the body's intake of certain nutrients?" "How do nutrient needs change for individuals undergoing chemotherapy?"

**C2.5** identify and evaluate strategies to prevent food- and nutrition-related diseases and illnesses

**Teacher prompts:** "How effective are marketing strategies that are currently used to promote increased consumption of fruits and vegetables?" "What public health strategies have been used to educate people about type 2 diabetes in specific high-risk groups? How effective are these strategies?" "How can government policies have an impact on the social determinants of nutrition-related diseases and illnesses?"

**C2.6** plan and prepare a food item or items to meet the nutritional needs of people with a specific illness or disease

### C3. Trends and Patterns in Food and Nutrition

By the end of this course, students will:

**C3.1** evaluate new and emerging food- and nutrition-related products and services in terms of their real or perceived benefits to Canadian consumers (*e.g., additives, functional foods, whole-wheat pasta, soy products, energy drinks, vitamin-enhanced drinks, local food initiatives, agri-tourism, molecular gastronomy, the slow food movement*)

**Teacher prompt:** "How has the increased consumption of energy drinks improved or compromised the overall health and nutritional status of individuals?"

**C3.2** explain why people adopt various eating patterns (*e.g., vegetarian diet, slow food diet, organic diet, local food diet, weight-loss program*)

**C3.3** assess the effects on overall health of various eating patterns and trends (*e.g., low-carbohydrate diets, promotion of trans-fat-free foods, promotion of antioxidants and phytochemicals*)

**Teacher prompts:** "What criteria would you use to assess the validity of the claims made about a new diet?" "What are some indicators of a fad diet as opposed to a sound nutritional program?"

**C3.4** explain some ways in which scientific research on nutrition and health has influenced government policy (*e.g., nutrition labelling requirements, trans-fat regulations, school food and beverage policies, policies to implement daily physical activity in schools*)

**Teacher prompts:** "What are some legislative changes that have affected current eating patterns and the overall health of populations? What effects have they had?" "What are the reasons for the requirement that trans fatty acids be listed separately on Canadian nutrition labels?"

**C3.5** plan and prepare a food item or items using a product that is currently being marketed as a functional food (*e.g., flax seed, high-protein pasta, blueberries, pomegranates, chia*)

## D. LOCAL AND GLOBAL ISSUES

### OVERALL EXPECTATIONS

By the end of this course, students will:

- D1. Food Security:** demonstrate an understanding of various factors involved in achieving and maintaining food security;
- D2. Food Production and Supply:** demonstrate an understanding of various factors that affect food production and supply;
- D3. Food Production and the Environment:** demonstrate an understanding of the impact of food production on the environment.

### SPECIFIC EXPECTATIONS

#### D1. Food Security

By the end of this course, students will:

- D1.1** explain the importance of each of the key components of food security (*e.g., availability, accessibility, adequacy, acceptability, sustainability*)

**Teacher prompts:** “Why would access to potable water be considered a food security issue?” “What steps can food banks take to ensure the adequacy of the food they offer to multi-ethnic communities?”

- D1.2** explain how and why various social, cultural, and economic factors (*e.g., gender, ethnicity, income, employment, religious or political affiliation*) contribute to nutritional inequalities among people within the same community

**Teacher prompts:** “Why are women more often undernourished than men in many regions or communities?” “Why does being an Aboriginal person in Canada increase one’s likelihood of experiencing inadequate nutrition?”

- D1.3** explain the relationships among poverty, food insecurity, poor nutrition, and poor health

**Teacher prompt:** “Why is poor health often associated with poverty and food insecurity?”

- D1.4** evaluate various food-distribution systems in terms of their impact on local and global food security (*e.g., systems that improve the availability of fair-trade products and local foods versus imported foods*)

**Teacher prompts:** “How does the demand for cash crops such as coffee, cocoa, or sugar affect food security?” “What supports might be required to help a farmer switch from cash cropping to subsistence farming?”

- D1.5** demonstrate the ability to combat food insecurity at the local and global level (*e.g., write to an elected representative or government official; volunteer with a breakfast program; fundraise for community water wells; plant trees; buy products from women-led cooperatives; become involved in a community garden*)

**Teacher prompt:** “What are some actions you can take to reduce local or global food insecurity?”

#### D2. Food Production and Supply

By the end of this course, students will:

- D2.1** explain how geographical factors, physical conditions, and natural disasters (*e.g., climate, weather, soil conditions, proximity to water, mudslides, floods, earthquakes*) affect food supply and production and water potability

**Teacher prompts:** “In what ways have food supply and production and water potability been affected after a recent natural disaster?” “Which countries’ or regions’ food supplies are most at risk because of climate change?” “How does climate change affect the food supply of indigenous people, in particular?” “How might climate change affect the different agricultural regions of Canada?”

**D2.2** explain the effects of various agricultural methods (e.g., crop rotation, integrated pest management, fallow fields, intercropping, no tillage) on local and/or global food production and yields

**Teacher prompts:** “Why might some farmers rotate between growing soybeans and corn on the same field?” “Why might regular tillage of soil decrease crop yields?” “How can leaving a field fallow for a season lead to increases in crop yields in future years? How often does a field need to be left fallow in order to ensure good crop yields?”

**D2.3** analyse the relationship between various economic, social, and political factors and food supply and production in a particular region or regions (e.g., debt-repayment requirements, demand for cash crops, oil prices, free-trade agreements, trade embargos or bans, controls on fishing and hunting, import-export restrictions to prevent or control outbreaks of disease)

**Teacher prompts:** “How do a country’s debt-repayment obligations affect its ability to produce its own food for its citizens?” “How does the production of cash crops affect the people of the exporting country and the importing country?”

**D2.4** analyse the effect of various trends in agriculture and aquaculture (e.g., organic farming, use of antibiotics, fish farming, genetic engineering, greenhouse food production) on local and global food supply and production

**Teacher prompt:** “In what ways do different interest groups and communities differ in their opinions about the risks and benefits of organic farming? What are some reasons for the differing opinions?”

### D3. Food Production and the Environment

By the end of this course, students will:

**D3.1** explain how consumer food choices affect the environment, locally and globally (e.g., demand for imported food increases the amount of energy used in transportation; choice of overpackaged products increases the volume

of waste going to landfills; demand for fair-trade products supports sustainable farming practices and small-scale farmers but may cause farmers to grow cash crops, such as cocoa and coffee, rather than food; demand for local produce supports farmers’ markets, reduces the use of preservatives, and lowers transportation costs)

**Teacher prompts:** “How can one person’s decision to purchase fair-trade chocolate have an impact on environmental conditions in a different part of the world?” “What is the environmental impact of purchasing bottled water?”

**D3.2** analyse the effect on the environment of various agricultural trends (e.g., growing crops for biofuels) and food production technologies (e.g., types of farm equipment, types of energy sources, climate-control techniques, genetic engineering of foods)

**Teacher prompt:** “What are some positive and negative environmental effects of using land for biofuel production rather than food production?”

**D3.3** analyse the effects of various environmental protection laws and regulations on food supply and production (e.g., policies related to forest preservation, fuel emission standards, pesticide use)

**Teacher prompt:** “How might regulations to limit pesticide use affect food production and consumption?”

**D3.4** demonstrate an understanding of health, safety, and environmental issues related to food supply and production (e.g., risks associated with the bioaccumulation of pesticides and hormones, risks of contamination during food production), and describe key aspects of legislation that is designed to protect Canadian consumers (e.g., Canadian Agricultural Products Act, Food and Drugs Act)

**Teacher prompts:** “How can consumer awareness of the food-production process benefit food producers, consumers, and the environment?” “What evidence was used to support the Government of Canada’s decision to reduce the use of bisphenol A in some food packaging?”

## E. FOOD-PREPARATION SKILLS

### OVERALL EXPECTATIONS

By the end of this course, students will:

- E1. Kitchen Safety:** demonstrate an understanding of practices that ensure or enhance kitchen safety;
- E2. Food Safety:** demonstrate an understanding of practices that ensure or enhance food safety;
- E3. Food Preparation:** demonstrate skills needed in food preparation.

### SPECIFIC EXPECTATIONS

#### E1. Kitchen Safety

By the end of this course, students will:

- E1.1** describe common accidents that can occur in the kitchen (*e.g., cuts, burns, fires, falls, poisoning, electric shocks*)
- E1.2** demonstrate an understanding of safe practices within the food-preparation area (*e.g., safely handle hot foods; prevent spatters, scalds, and cuts; wipe up spills immediately*)
- E1.3** demonstrate an understanding of appropriate emergency responses to common accidents associated with food preparation (*e.g., cuts, burns, scalds, fires*)

#### E2. Food Safety

By the end of this course, students will:

- E2.1** outline the causes and symptoms of food-borne illnesses (*e.g., E. coli poisoning, botulism poisoning, Clostridium perfringens poisoning, salmonellosis, listeriosis*) and techniques for preventing these illnesses
- E2.2** use appropriate personal hygiene practices to prevent contamination of food (*e.g., wash hands frequently; cover a cough or sneeze in their sleeve; use gloves to cover cuts or wounds; tie hair back*)

- E2.3** use safe food-handling practices to prevent cross-contamination by pathogens, parasites, and allergens in the food-preparation area (*e.g., wash fresh produce; sanitize cutting boards after contact with meat products; sanitize implements that come into contact with allergens when preparing food for or with people with known allergies; sanitize work surfaces; replace and/or sanitize sponges or cloths frequently; use proper clean-up procedures*)

- E2.4** follow appropriate protocols to ensure food safety (*e.g., cook foods to recommended temperatures; keep hot foods hot and cold foods cold; store food appropriately; wipe tops of cans before opening; check “best-before” dates; demonstrate awareness of common allergenic ingredients*)

#### E3. Food Preparation

By the end of this course, students will:

- E3.1** identify and select appropriate tools, equipment, and ingredients for use in food preparation
- E3.2** demonstrate the ability to safely use, maintain, clean, and store tools and equipment used in food preparation
- E3.3** demonstrate the ability to follow a recipe

**E3.4** demonstrate the ability to adapt recipes to accommodate specific dietary needs (*e.g., to adhere to religious dietary practices, to limit salt intake for somebody with high blood pressure, to adhere to ovo-lacto vegetarian dietary practices*)

**E3.5** demonstrate the ability to measure quantities accurately (*e.g., use different strategies for measuring wet and dry ingredients; level off excess amounts; measure liquids at eye level*)

**E3.6** demonstrate the correct use of food-preparation techniques (*e.g., stirring, beating, whipping, chopping, broiling, frying*)

**E3.7** demonstrate the ability to manage time effectively in food preparation

**E3.8** demonstrate the ability to plan, prepare, and serve a food item or items according to set criteria