Nutrition Science & Diet Therapy

Primary Career Cluster:	Human Services
Course Contact:	CTE.Stds@tn.gov
Course Code(s):	C19H16
Prerequisite(s):	*Nutrition Across the Lifespan* (C19H15) or *Health Science Education (C14H14)*
Credit:	1
Grade Level:	11
Focus Elective - Graduation Requirements:	Satisfies one of three credits required for elective focus if taken in conjunction with other Human Services or Health Science courses. In addition, satisfies one credit of laboratory science required for graduation.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition, when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the third course in the *Dietetics and Nutrition POS.* It is the second or third course in the *Therapeutic Services* POS programs of study.
Aligned Student Organization(s):	Family, Career and Community Leaders of America (FCCLA): http://www.tennesseefccla.org Health Occupations Students of America (HOSA): HOSA: http://www.tennesseehosa.org
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/education/career-and-technical-education/student-industry-certification.html
Teacher Endorsement(s):	050, 051, 154, 450, 577, 720
Required Teacher Certifications/Training:	Teachers who have never taught *Nutrition Science and Diet Therapy* MUST attend the training provided by the Department of Education.
Teacher Resources:	https://www.tn.gov/education/career-and-technical-education/career-clusters/cte-cluster-human-services.html Best for All Central: https://bestforall.tnedu.gov

Approved April 10, 2015; Amended Jan. 26, 2018; Nov. 2021

Course-at-a-Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st century skills necessary to be successful in career and in life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards which feed into intentionally designed programs of study.

Students engage in industry relevant content through general education integration and experiences such as career & technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom
CTSOs are a great resource to put classroom learning into real-life experiences for your students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course, note this is not an exhaustive list.

- Participate in CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry specific skills that involve teamwork and project management
- Participate in contests such as: Career Investigation; Interpersonal Communication; Professional Presentation; and Job Interview
- Participate in leadership activities such as Promote and Publicize FCCLA, Parliamentary Procedure, Entrepreneurship, and Chapter Service Project Display and Portfolio.

For more ideas and information, visit Tennessee FCCLA at https://www.tennesseefccla.org

Using Work-based Learning (WB) in Your Classroom
Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-7.1** | Shadow a dietitian or participate in an internship to observe a patient work ups and nutrition plan creation.
- **Standards 8.1-8.2** | Virtually connect with a clinical dietitian to present on various diseases related to diet.
- **Standards 9.1-9.6** | Work in a food bank.

Course Description

Nutrition Science and Diet Therapy is an applied knowledge course in nutrition for students interested in the role of nutrition in health and disease. Upon completion of this course, proficient students will be able to develop a nutrition care plan as part of the overall health care process, use methods for analyzing the nutritional health of a community, and understand the relationship of diet and nutrition to specific diseases. The course emphasizes the role of diet as a contributor to disease and its role in the prevention and treatment of disease. Artifacts will be created for inclusion in a portfolio, which will continue to build throughout the program of study. **The following standards should be implemented throughout the course as well as suggested 30 hours of time spent in the laboratory.**

Course Standards

1. **Professional Standards and Safety**

   1.1 Career Development Plan: Create a **career development plan** outlining **activities that will increase employment opportunities** for a nutrition science candidate including:
       a. Educational opportunities,
       b. Entry-level job opportunities,
       c. Volunteer plans to enhance the career experience, and
       d. Labor market data, including economic and demographic trends in nutrition related occupations.

   1.2 Ethics: Describe the **code of ethics for dietetic practitioners** published by the Academy of Nutrition and Dietetics or other health and nutritional organizations.

   1.3 Safety and Sanitation: Compile and critique **safety and sanitation procedures** related to handling, preparing, storing, and serving food from industry-approved technical manuals and government fact sheets. Identify and review common **laboratory safety procedures** including but not limited to prevention and control procedures. Incorporate safety procedures and complete a teacher made **safety test** with 100 percent accuracy.

2. **Nutrition and Health Overview**

   2.1 Optimum Nutrition: Explain the importance of a **balanced diet** in the achievement of **optimum nutrition**. Compare and contrast **nutritional needs of a normal healthy diet** with the needs of a client being treated for and/or recovering from illnesses.

   2.2 Body Mass Index: Define **BMI,** list the steps and information necessary to calculate BMI, and identify the **four weight categories**. Explain how dietitians and health care workers use BMI in the evaluation of their clients.

   2.3 Basal Metabolic Rate: Define **BMR** and list the steps and information necessary to calculate the **energy needs** and **ideal body weight** of a client.

3. **Nutrient Metabolism**

   3.1 <u>Major Metabolic Pathways:</u> Create a model and/or graphic illustrating the **major metabolic pathways** used to produce energy for the body. Explain the **chemical processes** that occur at each stage in the pathway. Categorize each stage as an **anabolic or a catabolic reaction**, citing relevant evidence from academic or medical materials. Stages include:
   - a. Glycolysis
   - b. Kreb's cycle
   - c. Electron transport
   - d. Anaerobic glycolysis

   3.2 <u>Energy Balance:</u> Demonstrate the ability to determine **energy balance** using standard tools and equations to calculate **Estimated Energy Requirements (EER).** Determine the **energy content of an individual's diet**. Based on the client's **EER and calculated caloric intake**, predict the effect on the **client's weight**. Calculate the following:
   - a. Physical Activity Level (PAL)
   - b. Total Energy Expenditure (TEE)
   - c. Energy Expenditure (BEE)
   - d. Thermic Effect of Food (TEF)
   - e. Metabolic Equivalents (METs)

4. **Nutrients**

   4.1 <u>Properties of Water:</u> Create a model or graphic that illustrates the **scientific properties of water.** Explain the **functions of water** in its relation to food, digestion, and maintenance of the body**.**

   4.2 <u>Structure of Carbohydrates:</u> Describe the **molecular structure of carbohydrates** in relation to their function in food, food preparation, and the body using domain-specific terms. Create a graphic illustration/model to compare and contrast the differences in **complex and simple carbohydrates**.
   Suggested Labs: Hydrolysis of Sugar; Sweetness & Solubility; Digestion of Starch

   4.3 <u>Properties and Composition of Lipids:</u> Analyze the **properties and composition of lipids** in relation to their functions in food preparation and to the body. Compare and contrast the composition of **saturated and unsaturated fats**. Explain the role of **cholesterol** in the body. Define and identify appropriate levels of **total cholesterol, triglycerides, HDL and LDL**.

   4.4 <u>Molecular Structure of Proteins:</u> Describe the molecular structure of proteins and identify **essential and nonessential amino acids**. Compare and contrast **complete and incomplete proteins** by analyzing the functions of protein in food and their importance in the body. Research **nutritional diseases** related to insufficient protein. Describe ways in which protein is used in food preparation.
   Suggested Labs: Effects of Minerals on Protein; Protein in Eggs

4.5 <u>Major and Trace Minerals:</u> Using NIH Fact Sheets, differentiate between the **major and trace minerals**, food sources of each, and **health conditions** associated with inadequate and excessive intake of both.

4.6 <u>Vitamins:</u> Use NIH Vitamin Fact Sheets to investigate the **chemical properties of water-soluble and fat-soluble vitamins.** Classify each vitamin and its chemical properties, identify food sources for each vitamin, and explain the main **role of vitamins** in the human body. *Suggested Labs:* Vitamin C Titration (using pipettes); Fat Soluble Vitamins.

5. Clinical Nutritional Assessments and Diagnosis

5.1 <u>Nutritional Assessments</u>: Compare and contrast the types of data collected, the insights they give into the **nutritional status of a client**, and the limitations of the data for the following **four types of nutritional assessments** used by a registered dietitian or other trained health care professional.
   a. Historical information
   b. Anthropometric data
   c. Physical examination
   d. Laboratory tests

5.2 <u>Nutrition Care Process:</u> Demonstrate the **Nutrition Care Process** to clients and/or their families and verbalize the role it plays in the total health care of a client. Outline what occurs in each of the **four phases of the process**: nutrition assessment, nutrition diagnosis, nutrition intervention, and nutrition monitoring and evaluation. Compile a list of frequently asked questions and their answers.

5.3 <u>Nutrition Assessment Data:</u> Analyze **nutrition assessment data**, including lab data related to protein status, iron status, diabetes, heart disease, and kidney disease, gathered from client information to formulate **nutrition diagnosis and an intervention plan**.

6. Diet Analysis

6.1 <u>Nutrient Intake</u>: Quantify the **nutrient intake of individuals** based on food journals, observations, or other reports. Using appropriate databases, determine the intake of **macro- and micro-nutrients**. Compare the individual's results to the recommended intake of each nutrient. Explain why the data would or would not be sufficient to make dietary changes. Distinguish between **nutrient dense and calorie dense foods**.

7. Nutritional Counseling

7.1 <u>Nutritional Counseling Techniques:</u> List and summarize various **counseling techniques**, including a patient centered approach to counseling. Practice interviewing clients about **dietary and lifestyle habits**. Explain the purpose of **follow up visits** and the link to continuing care.

7.2 <u>Questioning:</u> Describe the difference between **open ended and closed ended questions**. Demonstrate the use of open and closed ended questions during a **mock nutritional counseling session**.

8. **The Relationship of Nutrition to Specific Diseases**

   8.1 <u>Food Additives</u>: Drawing on findings from food and health research, compare and contrast the advantages and disadvantages of the **use of food additives in processed products**. Investigate **regulations governing the use of food additives** established by the Food and Drug Administration (FDA) and U.S. Department of Agriculture (USDA).
   Suggested Labs: Conduct a sensory evaluation of foods with and without food additives

   8.2 <u>Common Digestive Problems:</u> For each of the following common **digestive problems**, summarize symptoms, common causes, prevention strategies, and treatments. Explain how they can impact the **digestion and absorption of nutrients in the digestive system**.
      a. Choking
      b. Vomiting
      c. Diarrhea, irritable bowel syndrome, colitis
      d. Constipation
      e. Belching and gas
      f. Heartburn and acid indigestion
      g. Ulcers

   8.3 <u>Food Allergies and Intolerances:</u> Differentiate between **food allergies and food intolerances,** describing the body's reaction to each. Research the **eight most common food allergens** and describe **treatment for an allergic reaction**. Use academic research and medical literature in order to:
      a. Describe how the immune system of a person with a food allergy responds when exposed to the food allergen. Contrast this to reactions originating from a food intolerance.
      b. Outline precautions to take to avoid food allergens and/or foods to which an individual has an intolerance both at home and when eating out.
      c. Recommend food substitutes and recipe modifications to avoid problematic foods, citing specific reasoning and evidence to justify the recommendation.
   Suggested labs: Using indicators identify which "student" (solution) is allergic (shows reaction to) to an allergen

   8.4 <u>Obesity:</u> Research **obesity** using academic research and authoritative nutrition and obesity sources to:
      a. Describe the need for prevention of obesity to begin at an early age.
      b. Analyze the role of various factors, such as appetite-regulating hormones, gut microbiota, physical activity, and body composition, that affect energy homeostasis.
      c. Describe the contributions of genetics and environment to development of obesity.
      d. Justify the use of a research-based weight-loss strategy that ensures adequate nutrition.

e. Make a claim about the need for extreme measures (such as surgery) for extreme cases, supporting claim(s) with reasoning and evidence from research.
f. Compare and contrast the impact of lifestyle changes to increase physical activity and address stress and change environmental factors on an individual's weight.
g. Make recommendations on activities necessary for the maintenance of weight loss.

Suggested Labs: Anthropometry Lab; Nutritious Snack Lab

8.5 Eating Disorders: Differentiate between the **major eating disorders** (anorexia, bulimia, binge eating) and **other forms of disordered eating** then:
a. Describe the disease/condition, including symptoms and specific ways the body is affected.
b. Justify the role of nutrition as a contributor to the disease/condition and highlight specific dietary recommendations for minimizing those contributions.
c. Justify the role of nutrition in the treatment of the disease/condition, outlining a healthy eating plan and providing lists of specific foods/nutrients that should be included in the diet.
d. Make recommendations for other lifestyle changes and psychological interventions that will reduce the risk or aid in the therapy for the disease/condition.

Suggested labs: Demonstrate the effect of acid erosion on teeth

8.6 Vitamin Deficiencies: Research one of the following **diseases linked to vitamin consumption** issues. Summarize symptoms, common causes, prevention strategies, and treatments. Topics might include but are not limited to:
a. Beriberi
b. Pellagra
c. Scurvy
d. Rickets

8.7 Osteoporosis: Research **osteoporosis and the role minerals play** in the condition to:
a. Describe osteoporosis, including symptoms and organ(s) affected.
b. Justify the role of nutrition as a contributor to the disease/condition and highlight specific dietary recommendations for minimizing those contributions.
c. Justify the role of nutrition as a in the treatment of osteoporosis, outlining a healthy eating plan and providing lists of specific foods/nutrients to reduce or exclude from the diet and those that should be included in the diet.
d. Make recommendations for other lifestyle changes that will reduce the risks or aid the therapy for osteoporosis.

8.8 Nutrition and Cancer: Assess the **impact of nutrition on cancer** focusing on the body sites affected. Use academic research and medical literature to:
a. Describe the disease/condition, including symptoms and organ(s) affected.
b. Justify the role of nutrition as a contributor to the disease/condition and highlight specific dietary recommendations for minimizing those contributions.
c. Justify the role of nutrition in the treatment of the disease/condition, outlining a healthy eating plan for those undergoing treatments such as chemotherapy and

radiation, and providing lists of specific foods/nutrients that act as anti-promoters from the diet and those that should be included in the diet.

    d. Make recommendations for other lifestyle changes that will reduce the risk or aid in the therapy for the disease/condition.

8.9   <u>Diabetes:</u> Research the **impact of carbohydrates on diabetes,** differentiating between **Type 1 diabetes (T1DM)** and **Type 2 diabetes (T2DM).** Cite specific textual evidence from NIH MedlinePlus to:

    a. Describe the disease/condition, including symptoms and organ(s) affected.

    b. Justify the role of lifestyle factors as a contributor to the disease/condition and highlight specific dietary recommendations for minimizing those contributions.

    c. Justify the role of nutrition in the treatment of the disease/condition, outlining a healthy eating plan that includes a variety of dietary patterns to reduce or exclude unhealthy eating.

    d. Make recommendations for other lifestyle changes that will reduce the risk or aid in the therapy for the disease/condition.

Suggested Labs: Meal Preparation for diabetic patient; Count the Carbs activity

8.10 <u>Cardiovascular Disease, Hypertension, and Stroke:</u> Investigate the correlation between **fats in the diet and coronary artery disease, hypertension, and stroke,** citing evidence from academic research, medical literature, and NIH sources to:

    a. Describe the disease/condition, including symptoms and organ(s) affected.

    b. Justify the role of diet as a contributor to the disease/condition and highlight specific dietary recommendations for minimizing those contributions.

    c. Justify the role of nutrition in the treatment of the disease/condition, outlining a healthy eating pattern and providing lists of foods that should be included in the diet.

    d. Make recommendations for other lifestyle changes that will reduce the risks or aid the therapy for the disease/condition.

Suggested Labs: Extraction of Fat in Hot Dogs; Fat Content in Beef; Testing Oils in Frying; Alternative Fats in Foods; Low Fat Cookery Lab

8.11 <u>Nutrition and Renal Disease</u>: Investigate the correlation between **diet and renal disease**. Identify **markers of renal disease** and how they are impacted by dietary intervention.

    a. Describe the disease/condition, including symptoms and organ(s) affected.

    b. Justify the role of diet as a contributor to the disease/condition and highlight specific dietary recommendations for minimizing those contributions.

    c. Justify the role of nutrition in the treatment of the disease/condition, outlining a healthy eating pattern and providing lists of foods that should be included in the diet.

    d. Make recommendations for other lifestyle changes that will reduce the risks or aid the therapy for the disease/condition.

8.12 <u>Celiac Disease:</u> Research the correlation between **grain-based food consumption and celiac disease**, citing evidence to:

    a. Describe the disease/condition, including symptoms and organ(s) affected.

b. Explain the digestive problems and the impact on digestion and absorption of nutrients.

c. Make recommendations for precautions that will reduce the risks of exposure in eating venues other than home.

Suggested Labs: Compare & Contrast Alternative Ingredients for Gluten in Foods

8.13 Acids and Bases: Define *acidic* and *basic* as they relate to nutrition. Create a **pH scale** including examples of common acidic and basic foods. Summarize **symptoms, common causes, and treatments for heartburn, acid indigestion, and ulcers.**

Suggested Labs: Acids & Bases Indicators in Food

9. **Behavioral-Environmental Assessments: The Individual Community**

9.1 Community Nutritional Environment: Review the **tools for assessing community nutritional environment**. Select one tool that identifies existing problems in the local community. Make recommendations for **informing community members** about the problem(s).

9.2 Food Insecurity: Compare issues related to **hunger and malnutrition, food insecurity, and food insufficiency** locally, nationally, and globally. Describe short-term and sustainable development **relief efforts** used to combat these problems.

Portfolio: Artifacts that demonstrate student proficiency.

Standards Alignment Notes

*References to other standards include:

- FACS: National Standards for Family and Consumer Sciences Education, Second Edition: National Association of State Administrators of Family and Consumer Sciences, FACS.
- P21: Partnership for 21st Century Skills Framework for 21st Century Learning
  - Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.