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Text of Adopted 19 TAC

Chapter 130. Texas Essential Knowledge and Skills for Career and Technical Education

Subchapter I. Hospitality and Tourism

§130.221. Implementation of Texas Essential Knowledge and Skills for Hospitality and Tourism.

The provisions of this subchapter shall be implemented by school districts beginning with the 2010-2011 school year.

§130.222. Principles of Hospitality and Tourism (One-Half to One Credit).

(a) General requirements. This course is recommended for students in Grades 9-11.

(b) Introduction. The hospitality and tourism industry encompasses lodging; travel and tourism; recreation, amusements, attractions, and resorts; and restaurants and food beverage service. The hospitality and tourism industry maintains the largest national employment base in the private sector. Students use knowledge and skills that meet industry standards to function effectively in various positions within this multifaceted industry. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student applies academic skills for the hospitality and tourism industry. The student is expected to:

(A) write effectively using standard English and correct grammar;

(B) comprehend a variety of texts;

(C) create and proofread appropriate professional documents;

(D) calculate correctly using numerical concepts such as percentages and reasonable estimations; and

(E) infer how scientific principles are used in the hospitality and tourism industry.

(2) The student uses verbal and nonverbal communication to provide a positive experience for guests and employees. The student is expected to:

(A) develop and analyze formal and informal presentations; and

(B) practice customer service skills.

(3) The student demonstrates an understanding that personal success depends on personal effort. The student is expected to:

(A) demonstrate a proactive understanding of self-responsibility and self-management;

(B) explain the characteristics of personal values and principles;

(C) display positive attitudes and good work habits; and

(D) develop strategies for achieving accuracy and organizational skills.

(4) The student develops principles in time management, decision making, and prioritizing. The student is expected to:

(A) apply effective practices for managing time and energy;

(B) analyze the importance of balancing a career, family, and leisure activities;

(C) analyze the various steps in the decision-making process; and

(D) work independently.

(5) The student researches, analyzes, and explores lifestyle and career goals. The student is expected to:

(A) prioritize career goals and ways to achieve those goals in the hospitality and tourism industry;

(B) compare and contrast education or training needed for careers in the hospitality and tourism industry;

(C) examine related community service opportunities; and

(D) create a career portfolio.

(6) The student uses technology to gather information. The student is expected to:

(A) demonstrate and operate computer applications to perform workplace tasks;

(B) examine types of computerized systems used to manage operations and guest services in the hospitality and tourism industry; and

(C) evaluate information sources for the hospitality and tourism industry.

(7) The student demonstrates leadership, citizenship, and teamwork skills required for success. The student is expected to:

(A) develop team-building skills;

(B) develop decision-making and problem-solving skills;

(C) conduct and participate in meetings to accomplish tasks;

(D) determine leadership and teamwork qualities in creating a pleasant working atmosphere; and

(E) participate in community service activities.

(8) The student explains how employees, guests, and property are protected to minimize losses or liabilities in the hospitality and tourism industry. The student is expected to:

(A) determine job safety and security;

(B) implement the basics of sanitation;

(C) understand and demonstrate procedures for cleaning, sanitizing, and storing equipment and tools; and

(D) determine how environmental issues such as recycling and saving energy affect the hospitality and tourism industry.

(9) The student explores and explains the roles within each department of the hospitality and tourism industry. The student is expected to:

(A) examine the duties and responsibilities required within operational departments; and

(B) research the job qualifications for various positions to facilitate selection of career choices.

(10) The student demonstrates research skills applicable to the hospitality and tourism industry. The student is expected to:

(A) develop technical vocabulary to enhance customer service;

(B) use travel information to design a customized product for travelers;

(C) examine elements of a dining experience expected to satisfy guests at varied facilities such as a boardwalk vendor, cruise ship, chain restaurant, and five-star dining facility; and

(D) identify local and regional tourism issues.

(11) The student understands the importance of customer service. The student is expected to:

(A) determine ways to provide quality customer service;

(B) analyze how guests are affected by employee attitude, appearance, and actions;

(C) plan a cost effective trip or itinerary to meet customer needs; and

(D) examine different types of food service.

§130.223. Hotel Management (One-Half to One Credit).

(a) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Hospitality and Tourism.

(b) Introduction. This course focuses on the knowledge and skills needed to pursue staff and management positions available in the hotel industry. This in-depth study of the lodging industry includes departments within a hotel such as front desk, food and beverage, housekeeping, maintenance, human resources, and accounting. This course will focus on, but not be limited to, professional communication, leadership, management, human resources, technology, and accounting. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student gains academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within the hotel industry. The student is expected to:

(A) organize oral and written information;

(B) compose a variety of written documents such as agendas, thank you letters, presentations, and advertisements;

(C) calculate correctly using numerical concepts such as percentage and reasonable estimation in practical situations; and

(D) infer how scientific principles are used in the hotel industry.

(2) The student uses verbal and nonverbal communication skills to create, express, and interpret information for providing a positive experience for guests and employees. The student is expected to:

(A) develop, deliver, and critique presentations;

(B) analyze various marketing strategies for a hotel or an available service;

(C) demonstrate proper techniques for using telecommunications equipment;

(D) interpret verbal and nonverbal cues to enhance communication with individuals such as coworkers, customers, and clients;

(E) locate written information used to communicate with individuals such as coworkers and customers;

(F) apply active listening skills to obtain and clarify information; and

(G) follow directions and procedures independently.

(3) The student solves problems using critical thinking, innovation, and creativity independently and in teams. The student is expected to:

(A) generate creative ideas to solve problems by brainstorming possible solutions;

(B) employ critical-thinking and interpersonal skills to resolve conflicts with individuals such as coworkers, employers, customers, and clients; and

(C) use principles of budgeting and forecasting to maximize profit and growth.

(4) The student demonstrates an understanding that personal success depends on personal effort. The student is expected to:

(A) demonstrate a proactive understanding of self-responsibility and self-management;

(B) identify and demonstrate positive work behaviors and personal qualities for employability; and

(C) analyze the effects of health and wellness on employee performance.

(5) The student develops principles in time management, decision making, effective communication, and prioritizing. The student is expected to:

(A) apply effective practices for managing time and energy;

(B) implement stress-management techniques;

(C) analyze various steps in the decision-making process; and

(D) analyze the importance of balancing a career, family, and leisure activities.

(6) The student understands the importance of employability skills. The student is expected to:

(A) identify the required training or education requirements that lead to an appropriate industry certification;

(B) comprehend and model skills related to seeking employment;

(C) update a personal career portfolio;

(D) demonstrate proper interview techniques in applying for employment;

(E) complete required employment forms such as I-9, work visa, W-4, and licensures to meet employment requirements;

(F) research the local and regional labor workforce market to determine opportunities for advancement;

(G) investigate professional organizations and development training opportunities to keep current on relevant trends and information within the industry; and

(H) explore entrepreneurship opportunities.

(7) The student understands roles within teams, work units, departments, organizations, and the larger environment of the hotel industry. The student is expected to:

(A) distinguish among the duties and responsibilities within each department;

(B) implement quality-control standards and practices;

(C) compare and contrast full service hotels and limited service properties; and

(D) compare and contrast chain and franchise hotels, including revenue and support centers.

(8) The student uses information technology tools specific to hotel management to access, manage, integrate, and create information. The student is expected to:

(A) use information technology tools to manage and perform work responsibilities;

(B) use technology tools to perform workplace tasks;

(C) prepare complex multimedia publications;

(D) demonstrate knowledge and use of point-of-sale systems; and

(E) evaluate Internet resources for industry information.

(9) The student uses leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives. The student is expected to:

(A) apply team-building skills;

(B) apply decision-making and problem-solving skills;

(C) apply leadership and teamwork qualities in creating a pleasant working atmosphere; and

(D) participate in community leadership and teamwork opportunities to enhance professional skills.

(10) The student understands the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. The student is expected to:

(A) assess workplace conditions with regard to safety and health;

(B) apply safety and sanitation standards common to the workplace;

(C) analyze potential effects caused by common chemical and hazardous materials;

(D) demonstrate first aid and cardiopulmonary resuscitation skills;

(E) research sources of food-borne illness and determine ways to prevent them; and

(F) comprehend and model professional attire and personal hygiene.

(11) The student knows and understands the importance of professional ethics and legal responsibilities within the hotel industry. The student is expected to:

(A) demonstrate professional ethical standards; and

(B) interpret and explain written organizational policies and procedures to help employees perform their jobs.

(12) The student understands the knowledge and skills required for careers in the hotel management industry. The student is expected to:

(A) develop job-specific technical vocabulary;

(B) explain procedures to meet guest needs, including guest registration, rate assignment, room assignment, and determination of payment methods;

(C) determine the functions of meeting and event planning;

(D) evaluate current and emerging technologies to improve guest services; and

(E) understand the importance of check-out procedures to ensure guest satisfaction and verify settlement of account.

§130.224. Restaurant Management (One-Half to One Credit).

(a) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Hospitality and Tourism.

(b) Introduction. This course will emphasize the principles of planning, organizing, staffing, directing, and controlling the management of a variety of food service operations. The course will provide insight into the operation of a well-run restaurant. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student gains academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within the restaurant industry. The student is expected to:

(A) organize oral and written information;

(B) compose a variety of written documents such as agendas, menus, presentations, and advertisements;

(C) calculate correctly using numerical concepts such as percentages and estimations in practical situations;

(D) infer how scientific principles are used in the restaurant industry; and

(E) use mathematics and science knowledge and skills to produce quality food products.

(2) The student uses verbal and nonverbal communication skills to create, express, and interpret information for providing a positive experience for guests and employees. The student is expected to:

(A) develop, deliver, and critique presentations;

(B) analyze various marketing strategies for a restaurant or food venue;

(C) demonstrate proper techniques for answering restaurant phones;

(D) interpret verbal and nonverbal cues to enhance communication with coworkers, employers, customers, and clients; and

(E) apply active listening skills to obtain and clarify information.

(3) The student solves problems using critical thinking, innovation, and creativity independently and in teams. The student is expected to:

(A) generate creative ideas to solve problems by brainstorming possible solutions;

(B) employ critical-thinking and interpersonal skills to resolve conflicts with individuals such as coworkers, customers, clients, and employers; and

(C) use principles of budgeting and forecasting to maximize profit and growth.

(4) The student uses information technology tools specific to restaurant management to access, manage, integrate, and create information. The student is expected to:

(A) use information technology tools to manage and perform work responsibilities;

(B) use technology applications to perform workplace tasks;

(C) prepare complex multimedia publications;

(D) demonstrate knowledge and use of point-of-sale systems; and

(E) evaluate Internet resources for information.

(5) The student understands roles within teams, work units, departments, organizations, and the larger environment of the restaurant industry. The student is expected to:

(A) explain the different types and functions of departments;

(B) investigate quality-control standards and practices;

(C) differentiate between various styles of restaurant services such as table, buffet, and fast food;

(D) illustrate various place settings using proper placement of dining utensils; and

(E) demonstrate the proper service techniques in food service operations.

(6) The student understands the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. The student is expected to:

(A) assess workplace conditions with regard to safety and health;

(B) analyze potential effects caused by common chemicals and hazardous materials;

(C) demonstrate first aid and cardiopulmonary resuscitation skills;

(D) apply safety and sanitation standards common to the workplace;

(E) research sources of food-borne illness and determine ways to prevent them; and

(F) determine professional attire and personal hygiene for restaurant employees.

(7) The student uses leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives. The student is expected to:

(A) apply team-building skills;

(B) apply decision-making and problem-solving skills;

(C) determine leadership and teamwork qualities to aid in creating a pleasant working atmosphere; and

(D) participate in community leadership and teamwork opportunities to enhance professional skills.

(8) The student knows and understands the importance of professional ethics and legal responsibilities within the restaurant industry. The student is expected to:

(A) demonstrate ethical reasoning in a variety of workplace situations in order to make decisions;

(B) interpret and explain written organizational policies and procedures to help employees perform their jobs; and

(C) develop guidelines for professional conduct.

(9) The student demonstrates an understanding that personal success depends on personal effort. The student is expected to:

(A) demonstrate a proactive understanding of self-responsibility and self-management;

(B) identify behaviors needed to be employable and maintain employment such as positive work ethics and positive personal qualities;

(C) analyze the effects of health and wellness on employee performance;

(D) implement stress-management techniques; and

(E) follow directions and procedures independently.

(10) The student develops principles in time management, decision making, effective communication, and prioritizing. The student is expected to:

(A) apply effective practices for managing time and energy;

(B) analyze various steps in the career decision-making process; and

(C) discuss the importance of balancing a career, family, and leisure activities.

(11) The student knows and understands the importance of employability skills. The student is expected to:

(A) demonstrate skills related to seeking employment in the restaurant industry;

(B) identify the required training and educational requirements that lead toward an appropriate industry certification;

(C) select educational and work history highlights to include in a career portfolio;

(D) update a personal career portfolio;

(E) complete required employment forms such as I-9, work visa, W-4, and licensures to meet employment requirements;

(F) research the local and regional labor workforce market to determine opportunities for advancement;

(G) investigate professional development training opportunities to keep current on relevant trends and information within the industry; and

(H) explore entrepreneurship opportunities.

(12) The student understands the use of technical knowledge and skills required to pursue careers in the restaurant industry, including knowledge of design, operation, and maintenance of technological systems. The student is expected to:

(A) define job-specific technical vocabulary;

(B) analyze customer comments to formulate improvements in services and products and training of staff;

(C) detail ways to achieve high rates of customer satisfaction;

(D) use different types of payment options to facilitate customer payments for services; and

(E) demonstrate technical skills used in producing quality food service.

§130.225. Travel and Tourism Management (One-Half to One Credit).

(a) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Hospitality and Tourism.

(b) Introduction. This course incorporates management principles and procedures of the travel and tourism industry as well as destination geography, airlines, international travel, cruising, travel by rail, lodging, recreation, amusements, attractions, and resorts. Employment qualifications and opportunities are also included in this course. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student gains academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within the travel and tourism industry. The student is expected to:

(A) organize oral and written information;

(B) compose a variety of written documents such as itineraries, thank you letters, presentations, and advertisements;

(C) deliver different types of presentations such as informative, instructional, persuasive, and decision-making;

(D) calculate correctly using numerical concepts such as percentages and estimations in practical situations;

(E) investigate the elements of geography that affect travel and tourism customer service; and

(F) summarize how to use the state of the economy to plan products and service.

(2) The student uses oral and written communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:

(A) employ verbal skills when obtaining and conveying information;

(B) use verbal and nonverbal communication skills effectively with individuals such as customers, coworkers, and employers to foster positive relationships; and

(C) develop and deliver presentations using appropriate technology to engage and inform audiences.

(3) The student solves problems using critical-thinking skills independently and in teams. The student is expected to:

(A) generate creative ideas by brainstorming possible solutions;

(B) guide individuals through the process of making informed travel decisions;

(C) use principles of budgeting and forecasting to maximize profit and growth for travel and tourism establishments; and

(D) analyze customer comments to formulate improvements in services and products and training of staff.

(4) The student uses information technology tools specific to the travel and tourism industry to access, manage, integrate, and create information. The student is expected to:

(A) operate electronic mail applications to communicate within a workplace;

(B) distinguish among the different modes of travel such as airline, cruise line, and rail;

(C) differentiate among recreation, amusement, attraction, and resort venues;

(D) use technology applications to perform workplace tasks;

(E) understand the travel arrangements system used for booking reservations;

(F) employ computer operations applications to manage work tasks; and

(G) create complex multimedia publications.

(5) The student understands roles within teams, work units, departments, organizations, inter-organization systems, and the larger environment of the travel and tourism industry. The student is expected to:

(A) explain the functions and interactions of departments within a travel and tourism business;

(B) explain the functions and interactions of various travel and tourism businesses;

(C) implement quality-control systems and practices;

(D) develop and manage plans to accomplish organizational goals; and

(E) formulate collaboration with other industries to provide an all-inclusive product for the customer.

(6) The student understands the importance of health, safety, and environmental systems in the travel and tourism industry and their importance to organizational performance and regulatory compliance. The student is expected to:

(A) identify hazards common to workplaces such as safety, health, and environmental hazards;

(B) use industry standards to implement safety precautions to maintain a safe worksite;

(C) demonstrate first aid and cardiopulmonary resuscitation;

(D) describe environmental procedures that ensure a facility is in compliance with health codes;

(E) describe how to respond to emergency situations;

(F) analyze potential effects caused by common chemicals and hazardous materials; and

(G) analyze security measures to protect the guests, customers, and staff and to limit liability.

(7) The student uses leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives. The student is expected to:

(A) apply team-building skills;

(B) apply decision-making and problem-solving skills;

(C) apply teamwork and leadership qualities in creating a pleasant work environment;

(D) determine the impact of cultural diversity on teamwork; and

(E) participate in community service opportunities to enhance professional skills.

(8) The student knows and understands the importance of professional ethics and legal responsibilities. The student is expected to:

(A) apply ethical reasoning to a variety of workplace situations in order to make decisions;

(B) examine information on organizational policies in handbooks and manuals; and

(C) develop guidelines for professional conduct.

(9) The student knows and understands the importance of employability skills and is able to explore and effectively plan for managing travel and tourism careers. The student is expected to:

(A) identify behaviors necessary to be employable and maintain employment such as positive work ethics and positive personal qualities;

(B) identify the training and education requirements that lead toward an appropriate certification for employment;

(C) demonstrate skills related to seeking employment in the travel and tourism industry;

(D) demonstrate proper interview techniques;

(E) update a career portfolio;

(F) identify and exhibit traits for retaining employment;

(G) investigate professional development training opportunities to keep current within the industry;

(H) examine appropriate credentialing requirements to maintain compliance with industry requirements;

(I) interpret the effect of stress, fatigue, and anxiety on job performance;

(J) complete required employment forms such as I-9, work visa, W-4, and licensures to meet employment requirements;

(K) research the local and regional labor workforce market to determine opportunities for advancement; and

(L) explore entrepreneurship opportunities.

(10) The student develops principles in time management, decision making, effective communication, and prioritizing. The student is expected to:

(A) apply effective practices for managing time and energy;

(B) analyze various steps in the decision-making process; and

(C) discuss the importance of balancing a career, family, and leisure activities.

(11) The student uses technical knowledge and skills required to pursue careers in the travel and tourism industry. The student is expected to:

(A) develop job-specific technical vocabulary;

(B) use marketing techniques to sell products and services;

(C) evaluate current and emerging technologies to improve guest services;

(D) use different types of payment options;

(E) analyze customer service concepts;

(F) evaluate customer service scenarios;

(G) describe how customer service affects a company's bottom line;

(H) develop an awareness of cultural diversity to enhance travel planning by exploring differences in social etiquette, dress, and behaviors of different countries;

(I) demonstrate an understanding of tourism sales and distribution systems; and

(J) demonstrate knowledge of destination and attraction planning and development, including the use of organizations such as convention and visitor's bureaus and state tourist boards.

§130.226. Culinary Arts (One to Two Credits).

(a) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Restaurant Management, Lifetime Nutrition and Wellness, or Principles of Hospitality and Tourism.

(b) Introduction. Culinary Arts begins with the fundamentals and principles of the art of cooking and the science of baking and includes management and production skills and techniques. Students can pursue a national sanitation certification, a Texas culinary specialist certification, or any other appropriate industry certification. This course may be offered as a laboratory-based or internship course. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student applies advanced reading, writing, mathematics, and science skills for the food service industry. The student is expected to:

(A) compose industry appropriate documents;

(B) comprehend a variety of texts such as operations and training manuals;

(C) calculate correctly using numerical concepts such as percentages and estimations in practical situations, including weight and measures;

(D) understand scientific principles used in culinary arts;

(E) read and comprehend standardized recipes;

(F) write and convert standardized recipes; and

(G) calculate and manage food costs.

(2) The student integrates listening, writing, and speaking skills using verbal and nonverbal communication to enhance operations, guest satisfaction, and professional development. The student is expected to:

(A) create formal or informal presentations;

(B) properly answer business phones;

(C) write instructions for a specific restaurant or culinary procedure or the use of a piece of equipment; and

(D) attend and participate in a staff meeting.

(3) The student demonstrates an understanding that personal success depends on personal effort. The student is expected to:

(A) demonstrate a proactive understanding of self-responsibility and self-management;

(B) explain the characteristics of personal values and principles;

(C) demonstrate positive attitudes and work habits;

(D) demonstrate exemplary appearance and personal hygiene; and

(E) evaluate the effects of exercise and nutritional dietary habits and emotional factors such as stress, fatigue, or anxiety on job performance.

(4) The student develops principles in time management, decision making, effective communication, and prioritizing. The student is expected to:

(A) apply effective practices for managing time and energy;

(B) analyze various steps in the decision-making process; and

(C) analyze the importance of balancing a career, family, and leisure activities.

(5) The student researches, analyzes, and explores lifestyle and career goals. The student examines jobs available in the food service industry and accesses career opportunities. The student is expected to:

(A) research the major job duties and qualifications for all staff and managerial positions to facilitate selection of career choices in culinary arts;

(B) update a personal career portfolio;

(C) demonstrate proper interview techniques;

(D) establish personal short-term and long-term goals; and

(E) examine food service related community service opportunities.

(6) The student understands the history of food service and the use of the professional kitchen. The student is expected to:

(A) research famous chefs from history and note their major accomplishments;

(B) identify global cultures and traditions related to food;

(C) summarize historical entrepreneurs who influenced food service in the United States;

(D) analyze how current trends in society affect the food service industry;

(E) use large and small equipment in a commercial kitchen;

(F) develop food production and presentation techniques;

(G) demonstrate moist and dry cookery methods;

(H) demonstrate the preparation skills of items commonly prepared in food service operations such as breakfast cookery, salads and dressings, soups and sandwiches, stocks and sauces, appetizers, seafood, poultry, meat, pastas and grains, and fruits and vegetables;

(I) demonstrate baking techniques such as yeast breads and rolls, quick breads, and desserts;

(J) demonstrate proper receiving and storage techniques;

(K) demonstrate proper cleaning of equipment and maintenance of the commercial kitchen; and

(L) demonstrate types of table setting, dining, and service skills.

(7) The student uses technology and computer applications to manage food service operations. The student is expected to:

(A) use technology tools appropriate for the industry;

(B) operate technology applications to perform workplace tasks;

(C) explain the use of point-of-sale systems;

(D) demonstrate knowledge in computer programs used for food production; and

(E) evaluate information sources for culinary arts.

(8) The student demonstrates leadership, citizenship, and teamwork skills required for success. The student is expected to:

(A) apply team-building skills;

(B) apply decision-making and problem-solving skills;

(C) determine leadership and teamwork qualities in creating a pleasant working atmosphere; and

(D) participate in community leadership and teamwork opportunities to enhance professional skills.

(9) The student explains how employees, guests, and property are protected to minimize losses or liabilities. The student is expected to:

(A) determine basics of safety in culinary arts;

(B) assess workplace conditions and identify safety hazards;

(C) determine the basics of sanitation in a professional kitchen;

(D) assess food hazards and determine ways to prevent food hazards; and

(E) prepare for a state or national food sanitation certification or other appropriate certifications.

(10) The student recognizes and models work ethics and legal responsibilities. The student is expected to:

(A) understand and comply with laws and regulations specific to the food service industry; and

(B) demonstrate a positive work ethic.

(11) The student demonstrates the knowledge and skills required for careers in the restaurant, food, and beverage industry. The student is expected to:

(A) understand the basics of nutrition;

(B) analyze the concepts of customer service and determine the critical moments of good service;

(C) develop a marketing plan;

(D) identify purchasing specifications and write purchase orders;

(E) determine proper receiving, storage, and distribution techniques;

(F) analyze international cuisines;

(G) detail ways to achieve high rates of customer satisfaction; and

(H) analyze how guests are affected by employee attitude, appearance, and actions.

§130.227. Practicum in Culinary Arts (Two to Three Credits).

(a) General Requirements. This course is recommended for students in Grades 11-12. Recommended prerequisite: Culinary Arts or Hotel Management.

(b) Introduction.

(1) This course is a unique practicum that provides occupationally specific opportunities for students to participate in a learning experience that combines classroom instruction with actual business and industry career experiences. Practicum in Culinary Arts integrates academic and career and technical education; provides more interdisciplinary instruction; and supports strong partnerships

among schools, businesses, and community institutions with the goal of preparing students with a variety of skills in a fast-changing workplace.

(2) Students are taught employability skills, which include job-specific skills applicable to their training plan, job interview techniques, communication skills, financial and budget activities, human relations, and portfolio development. Practicum in Culinary Arts is relevant and rigorous, supports student application of academic standards, and effectively prepares students for college and career success.

(3) Instruction may be delivered through school-based laboratory training or through work-based delivery arrangements such as cooperative education, mentoring, and job shadowing.

(4) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student uses employability skills to gain an entry-level job in a high-skill, high-wage, or high-demand field. The student is expected to:

(A) identify employment opportunities;

(B) demonstrate the application of essential workplace skills in the career acquisition process;

(C) complete employment-related documents such as job applications and I-9 and W-4 forms; and

(D) demonstrate proper interview techniques in various situations.

(2) The student develops skills for success in the workplace. The student is expected to:

(A) comprehend and model appropriate grooming and appearance for the workplace;

(B) demonstrate dependability, punctuality, and initiative;

(C) develop positive interpersonal skills, including respect for diversity;

(D) demonstrate appropriate business and personal etiquette in the workplace;

(E) exhibit productive work habits, ethical practices, and a positive attitude;

(F) demonstrate knowledge of personal and occupational health and safety practices in the workplace;

(G) demonstrate the ability to work with the other employees to support the organization and complete assigned tasks;

(H) prioritize work to fulfill responsibilities and meet deadlines;

(I) evaluate the relationship of good physical and mental health to job success and personal achievement;

(J) demonstrate effective verbal, non-verbal, written, and electronic communication skills; and

(K) apply effective listening skills used in the workplace.

(3) The student demonstrates work ethics, employer expectations, interaction with diverse populations, and communication skills in the workplace. The student is expected to:

(A) illustrate how personal integrity affects human relations on the job;

(B) demonstrate characteristics of successful working relationships such as teamwork, conflict resolution, self-control, and the ability to accept criticism;

(C) analyze employer expectations;

(D) demonstrate respect for the rights of others;

(E) demonstrate ethical standards; and

(F) comply with organizational policies.

(4) The student applies academics with job-readiness skills. The student is expected to:

(A) apply mathematical skills to business transactions;

(B) develop a personal budget based on career choice;

(C) interpret data from documents such as tables, charts, and graphs to estimate and find solutions to problems; and

(D) organize and compose workplace documents.

(5) The student applies ethical behavior standards and legal responsibilities within the workplace. The student is expected to:

(A) research and compare published workplace policies;

(B) apply responsible and ethical behavior;

(C) summarize provisions of the Fair Labor Standards Act;

(D) describe the consequences of breach of confidentiality; and

(E) research laws related to culinary arts professions.

(6) The student applies the use of self-development techniques and interpersonal skills to accomplish objectives. The student is expected to:

(A) identify and practice effective interpersonal and team-building skills involving situations with coworkers, managers, and customers; and

(B) apply leadership and career development skills through participation in activities such as career and technical student organizations.

(7) The student uses concepts and skills related to safety in the workplace. The student is expected:

(A) identify and apply safe working practices;

(B) solve problems related to unsafe work practices and attitudes;

(C) explain Occupational Safety and Health Administration regulations in the workplace; and

(D) analyze health and wellness practices that influence job performance.

(8) The student evaluates personal attitudes and work habits that support career retention and advancement. The student is expected to:

(A) analyze the future employment outlook in the occupational area;

(B) describe entrepreneurial opportunities in the area of culinary arts;

(C) compare rewards and demands for various levels of employment in the area of culinary arts;

(D) evaluate strategies for career retention and advancement in response to the changing global workplace;

(E) summarize the rights and responsibilities of employers and employees; and

(F) determine effective money management and financial planning techniques.

(9) The student identifies skills and attributes necessary for professional advancement. The student is expected to:

(A) evaluate employment options, including salaries and benefits;

(B) determine factors that affect career choices such as personal interests, abilities, priorities, and family responsibilities;

(C) determine continuing education opportunities that enhance career advancement and promote lifelong learning; and

(D) demonstrate effective methods to secure, maintain, and terminate employment.

(10) The student understands the history of food service and the use of the professional kitchen. The student is expected to:

(A) research famous chefs in history and note their major accomplishments;

(B) identify global cultures and traditions related to food;

(C) summarize historical entrepreneurs who influenced food service in the United States;

(D) analyze how current trends in society affect the food service industry;

(E) use large and small equipment in a commercial kitchen;

(F) develop food production and presentation techniques;

(G) demonstrate moist and dry cookery methods;

(H) demonstrate food preparation skills used in commercial food service preparations such as breakfast cookery, salads and dressings, soups and sandwiches, stocks and sauces, appetizers, seafood, poultry cookery, meat cookery, pastas and grains, and fruits and vegetables;

(I) demonstrate baking techniques such as yeast breads and rolls, quick breads, and desserts;

(J) demonstrate proper receiving and storage techniques;

(K) demonstrate proper cleaning of equipment and maintenance of the commercial kitchen; and

(L) demonstrate types of table setting, dining, and service skills.

(11) The student documents technical knowledge and skills. The student is expected to:

(A) complete a professional career portfolio to include:

(i) an updated resumé;

(ii) official documentation of attainment of technical skill competencies;

(iii) licensures or certifications;

(iv) recognitions, awards, and scholarships;

(v) community service hours;

(vi) participation in student and professional organizations;

(vii) abstract of key points of the practicum; and

(viii) practicum supervisor evaluations; and

(B) present the professional career portfolio to interested stakeholders.

§130.228. Hospitality Services (One to Two Credits).

(a) General requirements. This course is recommended for students in Grades 11-12. Recommended prerequisite: Hotel Management, Travel and Tourism Management, or Restaurant Management.

(b) Introduction. Hospitality Services provides students with the academic and technical preparation to pursue high-demand and high-skill careers in hospitality related industries. The knowledge and skills are acquired within a sequential, standards-based program that integrates hands-on and project-based instruction.

Standards included in the Hospitality Services course are designed to prepare students for nationally recognized industry certifications, postsecondary education, and entry-level careers. In addition, Hospitality Services is designed so that performance standards meet employer expectations, enhancing the employability of students. Instruction may be delivered through laboratory training or through internships, mentoring, or job shadowing. Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student gains additional academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within the hospitality services industry. The student is expected to:

(A) apply advanced reading, writing, and mathematical skills necessary to perform job tasks in the hospitality industry;

(B) explain the effects that supply and demand have on the hospitality industry;

(C) develop marketing techniques;

(D) apply multiple time zones, climate, and seasons to create travel products;

(E) gather information from domestic and international sources using tools such as the Internet and maps to plan travel to other countries; and

(F) examine cultural differences of other areas, regions, and countries.

(2) The student uses listening, oral, written, and media communication skills in creating, expressing, and interpreting information and ideas, including technical terminology and information. The student is expected to:

(A) interpret verbal and nonverbal communication;

(B) recognize and respond to guest needs;

(C) outline procedures for processing messages;

(D) exhibit public relations skills;

(E) apply alternate communication services to assist customers with specialized needs; and

(F) design and present a marketing tool to promote a hospitality product that may contribute to the local economy.

(3) The student researches career opportunities and qualifications to broaden awareness of careers available in the hospitality industry. The student is expected to:

(A) outline a plan for an effective job search;

(B) demonstrate flexibility to learn new knowledge and skills;

(C) manage work responsibilities and life responsibilities;

(D) update a personal career portfolio;

(E) evaluate personal skills that may determine individual potential for growth within the hospitality industry;

(F) explain what is needed to achieve job advancement;

(G) understand the role of professional organizations or industry associations;

(H) examine the procedures in maintaining licensure, certification, or credentials for a chosen occupation;

(I) describe the types of facility ownership and determine the advantages and disadvantages for each;

(J) analyze future employment outlooks;

(K) demonstrate appropriate business and personal etiquette;

(L) develop written organizational policies to ensure successful hospitality operations, guest satisfaction, and employee success;

(M) use organizational charts to analyze workplace operations;

(N) research the major duties and qualifications for hospitality managerial positions; and

(O) review the functions, skills, and tasks of essential departments within a hospitality operation.

(4) The student examines and reviews ethical and legal responsibilities related to guests, employees, and conduct within the establishment to maintain high industry standards. The student is expected to:

(A) formulate improvements for customer service from guest comments;

(B) examine laws regarding hiring, harassment, and safety issues;

(C) determine legal responsibilities and employer policies; and

(D) analyze ethical considerations.

(5) The student uses information technology tools specific to hospitality service careers to access, manage, integrate, and create information. The student is expected to:

(A) examine types of technology used to manage hospitality service operations;

(B) research website information on hospitality service operations; and

(C) evaluate current and emerging technologies provided by the hospitality industry to improve guest service.

(6) The student applies leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives. The student is expected to:

(A) model qualities in employee retention by creating a pleasant working atmosphere for staff members;

(B) formulate staff training plans to create an effective working team; and

(C) apply conflict-management skills to facilitate solutions.

(7) The student solves problems using critical-thinking skills independently and in teams. The student is expected to:

(A) manage profitability by implementing effective marketing strategies;

(B) develop promotional packages;

(C) devise strategies for maximizing customer satisfaction;

(D) resolve unexpected situations; and

(E) create a business plan to examine employment opportunities in entrepreneurship.

(8) The student reviews the importance of health, safety, and environmental management systems in organizations and their importance to organization performance and regulatory compliance. The student is expected to:

(A) determine local safety and sanitation requirements;

(B) determine solutions to emergency situations;

(C) explain how key control procedures protect guests and minimize risks;

(D) explain how cash control procedures are used to protect funds;

(E) explain how guests and property are protected to minimize losses or liabilities;

(F) outline safety and security issues for individuals and groups in multiple environments to minimize risks;

(G) recognize potential, real, and perceived natural, social, or terrorism emergency situations in order to respond appropriately;

(H) examine equipment safety, functionality, and durability to protect guests and minimize replacement costs;

(I) evaluate methods for equipment maintenance and repair to minimize down time;

(J) determine sources of assistance to use in emergency situations, including self, coworkers, customers, and guests; and

(K) examine safety and security information relevant to the venue.

(9) The student understands roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. The student is expected to:

(A) implement a set of operating procedures to comply with company requirements;

(B) evaluate prepared foods for quality and presentation to set quality standards in accordance with company standards;

(C) practice basic nutrition skills by planning, preparing, and presenting quality foods;

(D) evaluate types of kitchen equipment to match equipment with correct cooking methodology;

(E) use detailed processes to provide customer service in accordance with company policy;

(F) summarize the importance of housekeeping standards to assure guest satisfaction;

(G) prepare a staffing guide to schedule various staff positions to assure guest satisfaction;

(H) investigate how operations manage inventories to maintain adequate quantities of recycled and non-recycled items;

(I) explain how a status report is used to ensure housekeeping standards;

(J) outline the factors to consider when determining the size of an inventory purchase to maintain desired quantities based on varying occupancy levels;

(K) describe feasible collaboration with other industries to provide an inclusive product to the customer;

(L) compare venues and the unique organizational structure of various operating units;

(M) use guidelines for access control to determine guest and group admission procedures;

(N) apply traffic control procedures to facilitate movement of people and vehicles;

(O) evaluate maintenance issues to determine if special training of personnel is required; and

(P) research ideas needed to develop programs and products unique to each venue.

(10) The student uses technological knowledge and skills required to pursue careers in food service. The student is expected to:

(A) use technology to develop a set of operating procedures to comply with company requirements;

(B) analyze prepared foods for quality and presentation according to company standards; and

(C) provide customer service by following appropriate industry standards.

(11) The student uses technological knowledge and skills required to pursue careers in hotel services. The student is expected to:

(A) describe the necessary information collected during the registration process to correctly register guests;

(B) explain how room rates are established with arriving guests to assign the appropriate rate;

(C) explain how availability, room status, and other standard operating guidelines are used to assign rooms to arriving guests;

(D) explain how methods of payment are established with arriving guests to clarify payment procedures;

(E) explain how a hotel's computer system is used to create guest accounts;

(F) summarize correct check-out procedures to prevent oversights or errors; and

(G) examine the account settlement procedures on different types of payment.

(12) The student uses technological knowledge and skills required to pursue careers in travel and tourism. The student is expected to:

(A) develop technical vocabulary to enhance customer service;

(B) compare and contrast diverse transportation and lodging options to increase customer choices;

(C) examine elements of a dining experience expected to satisfy guests at varied facilities such as a boardwalk vendor, cruise ship, chain restaurant, and a five-star dining facility;

(D) integrate various and diverse elements of the travel and tourism industry to create a personalized travel experience for a customer; and

(E) evaluate and compare services and products from related industries.

§130.229. Practicum in Hospitality Services (Two to Three Credits).

(a) General requirements. This course is recommended for students in Grades 11-12. Recommended prerequisite: Hospitality Services.

(b) Introduction.

(1) A unique practicum experience provides opportunities for students to participate in a learning experience that combines classroom instruction with actual business and industry career experiences. Practicum in Hospitality Services integrates academic and career and technical education; provides more interdisciplinary instruction; and supports strong partnerships among schools, businesses, and community institutions with the goal of preparing students with a variety of skills in a fast-changing workplace.

(2) Students are taught employability skills, including job-specific skills applicable to their training plan, job interview techniques, communication skills, financial and budget activities, human relations, and portfolio development. Practicum in Hospitality Services is relevant and rigorous, supports student attainment of academic and technical standards, and effectively prepares students for college and career success.

(3) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student uses employability skills to gain an entry-level job in a high-skill, high-wage, or high-demand field. The student is expected to:

(A) identify employment opportunities;

(B) demonstrate the application of essential workplace skills in the career acquisition process;

(C) complete employment-related documents such as job applications and I-9 and W-4 forms;

(D) demonstrate proper interview techniques in various situations;

(E) demonstrate verbal, nonverbal, written, and electronic communication skills; and

(F) apply effective listening skills used in the workplace.

(2) The student develops skills for success in the workplace. The student is expected to:

(A) comprehend and model appropriate grooming and appearance for the workplace;

(B) demonstrate dependability, punctuality, and initiative;

(C) develop positive interpersonal skills, including respect for diversity;

(D) demonstrate appropriate business and personal etiquette in the workplace;

(E) exhibit productive work habits, ethical practices, and a positive attitude;

(F) demonstrate knowledge of personal and occupational safety practices in the workplace;

(G) demonstrate the ability to work with the other employees to support the organization and complete assigned tasks;

(H) prioritize work to fulfill responsibilities and meet deadlines; and

(I) evaluate the relationship of good physical and mental health to job success and personal achievement.

(3) The student applies work ethics, employer expectations, interaction with diverse populations, and communication skills in the workplace. The student is expected to:

(A) illustrate how personal integrity affects human relations on the job;

(B) demonstrate characteristics of successful working relationships such as teamwork, conflict resolution, self-control, and ability to accept criticism;

(C) analyze employer expectations;

(D) demonstrate respect for the rights of others;

(E) demonstrate ethical standards; and

(F) comply with organizational policies and procedures.

(4) The student applies academics with career readiness skills. The student is expected to:

(A) apply mathematical skills to business transactions;

(B) develop a personal budget based on career choice;

(C) interpret data from documents such as tables, charts, and graphs to estimate and find solutions to problems; and

(D) organize and compose workplace business documents.

(5) The student applies ethical behavior standards and legal responsibilities within the workplace. The student is expected to:

(A) research and compare published workplace policies;

(B) apply responsible and ethical behavior;

(C) summarize provisions of the Fair Labor Standards Act;

(D) describe the consequences of breach of confidentiality; and

(E) research laws related to different hospitality services professions.

(6) The student applies the use of self-development techniques and interpersonal skills to accomplish objectives. The student is expected to:

(A) identify and practice effective interpersonal and team-building skills involving situations with coworkers, managers, and customers; and

(B) apply leadership and career development skills through participation in activities such as career and technical student organizations.

(7) The student applies concepts and skills related to safety in the workplace. The student is expected to:

(A) identify and apply safe working practices;

(B) solve problems related to unsafe work practices and attitudes;

(C) explain Occupational Safety and Health Administration regulations in the workplace; and

(D) analyze health and wellness practices that influence job performance.

(8) The student evaluates personal attitudes and work habits that support career retention and advancement. The student is expected to:

(A) analyze the future employment outlook in the occupational area;

(B) describe entrepreneurial opportunities in the hospitality services area;

(C) compare rewards and demands for various levels of employment in the area of hospitality services;

(D) evaluate strategies for career retention and advancement in response to the changing global workplace;

(E) summarize the rights and responsibilities of employers and employees; and

(F) determine effective money management and financial planning techniques.

(9) The student identifies skills and attributes necessary for professional advancement. The student is expected to:

(A) evaluate employment options, including salaries and benefits;

(B) determine factors that affect career choices such as personal interests, abilities, priorities, and family responsibilities;

(C) determine continuing education opportunities that enhance career advancement and promote lifelong learning; and

(D) demonstrate effective methods to secure, maintain, and terminate employment.

(10) The student understands roles within teams, work units, departments, organizations, and the larger environment of the hospitality services industry. The student is expected to:

(A) explain the different types and functions of departments;

(B) perform duties in each of the departments of a hotel or tourism venue;

(C) compare and contrast full service hotels and limited service properties;

(D) analyze the differences between chain and franchise hotels; and

(E) explore the job duties in travel and tourism, recreation, and amusement and attraction venues.

(11) The student understands the knowledge and skills required for careers in the hotel management industry. The student is expected to:

(A) develop job-specific technical vocabulary;

(B) explain technical procedures needed to meet guest needs such as registration, rate assignment, room assignment, and determination of payment methods;

(C) apply the fundamentals of planning meetings and events;

(D) evaluate current and emerging technologies to improve guest services; and

(E) determine the correct procedures for check-out, bill payment, and settlement of accounts to ensure guest satisfaction.

(12) The student documents technical knowledge and skills. The student is expected to:

(A) complete a professional portfolio to include:

(i) an updated resumé;

(ii) official documentation of attainment of technical skill competencies, licensures, or certifications;

(iii) recognitions, awards, and scholarships;

(iv) community service hours;

(v) student organization participation; and

(vi) practicum supervisor evaluations; and

(B) present the professional career portfolio to interested stakeholders.

§130.230. Food Science (One Credit).

(a) General requirements. This course is recommended for students in Grades 11-12. Prerequisites: three units of science. Recommended prerequisite: Principles of Hospitality and Tourism. To receive credit in science, students must meet the 40% laboratory and fieldwork requirement identified in §74.3(b)(2)(C) of this title (relating to Description of a Required Secondary Curriculum).

(b) Introduction.

(1) Food Science. In Food Science students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Food Science is the study of the nature of foods, the causes of deterioration, the principles underlying food processing, and the improvement of foods for the consuming public.

(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

(3) Scientific inquiry. Food scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.

(4) Science and social ethics. Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).

(5) Science, systems, and models. A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a

system in terms of its components and how these components relate to each other, to the whole, and to the external environment.

(6) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during laboratory and field investigations; and

(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.

(2) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:

(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;

(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;

(C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;

(D) distinguish between scientific hypotheses and scientific theories;

(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;

(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools and equipment;

(G) analyze, evaluate, make inferences, and predict trends from data; and

(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.

(3) The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:

(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;

(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;

(C) draw inferences based on data related to promotional materials for products and services;

(D) evaluate the impact of scientific research on society and the environment;

(E) evaluate models according to their limitations in representing biological objects or events; and

(F) research and describe the history of science and contributions of scientists.

(4) The student analyzes the role of acids and bases in the food sciences. The student is expected to:

(A) identify the properties of acids and bases;

(B) describe the pH scale and how it is used;

(C) use various indicators to measure the pH of solutions;

(D) describe the importance of pH in digestion and blood; and

(E) discuss ways pH is related to the properties of food, its safety, and its freshness.

(5) The student applies the principles of food safety and microbiology. The student is expected to:

(A) investigate the properties of microorganisms that cause food spoilage;

(B) explain the difference between food intoxication and food infection;

(C) examine the conditions under which the important pathogens are commonly destroyed, inactivated, or rendered harmless in foods;

(D) discuss the difference between microorganisms that are helpful and those that are harmful; and

(E) analyze sanitary food-handling practices.

(6) The student studies the chemical properties of food. The student is expected to:

(A) discuss elements, compounds, mixtures, and formulas;

(B) explain the Periodic Table of the Elements;

(C) compare elements and compounds;

(D) describe heterogeneous and homogeneous mixtures;

(E) explain the similarities and differences between heterogeneous and homogenous mixtures;

(F) identify chemical examples of pure substances and mixtures;

(G) identify chemical symbols, formulas, and equations and explain how they are used in food science;

(H) analyze the occurrence of specific chemical reactions; and

(I) analyze chemical and physical changes in food.

(7) The student analyzes solutions, colloids, solids, gels, foams, and emulsions. The student is expected to:

(A) identify the solvent and solute in a given solution;

(B) discuss the effect of a solute and its concentration on the boiling and freezing points of a solution;

(C) calculate the concentration of a solution using mass percent;

(D) compare and contrast unsaturated, saturated, and supersaturated solutions;

(E) describe the properties of colloidal dispersions;

(F) explain the three parts of an emulsion and their relationship to each other; and

(G) identify various food emulsions and the types of each emulsion.

(8) The student understands the functions of enzymes. The student is expected to:

(A) describe how enzymes act as catalysts in chemical reactions;

(B) explain the relationship between an enzyme and a substrate;

(C) discuss the enzymes involved in digestion;

(D) identify factors that affect enzyme activity; and

(E) explain how enzyme reactions are involved in food preparation.

(9) The student understands the role of fermentation in food sciences. The student is expected to:

(A) explain anaerobic respiration and how it is involved in metabolism and food science;

(B) list reasons food is fermented;

(C) describe how bacteria is used to ferment food, including how lactic acid bacteria creates sauerkraut from cabbage;

(D) compare fresh-pack pickling and brine pickling; and

(E) describe the process of making vinegar.

(10) The student discusses how leavening agents are used in baking. The student is expected to:

(A) describe the purpose of leavening agents in baked goods;

(B) identify and describe major leavening agents;

(C) explain why baking soda is used with an acid in baked goods;

(D) describe the types of dough and batters used in making quick breads;

(E) analyze the ingredients in baking powder;

(F) discuss how air and steam act as leavening agents; and

(G) identify the purposes of the ingredients used in making yeast breads.

(11) The student understands the purposes of additives in food. The student is expected to:

(A) discuss the use of food additives;

(B) describe properties of a desirable food preservative;

(C) explain why additives used as antioxidants are added to food;

(D) explain the difference between natural and artificial additives;

(E) identify kinds of sweeteners used in food processing;

(F) name nutrients that are used as food additives;

(G) discuss the advantages and disadvantages of using food additives; and

(H) identify agencies involved in regulating food additives.

(12) The student understands the physiology of digestion. The student is expected to:

(A) define mechanical and chemical digestive processes;

(B) explain the difference between mechanical and chemical digestive processes; and

(C) explain absorption as part of the digestive process.

(13) The student understands metabolism. The student is expected to:

(A) analyze components and byproducts of metabolism;

(B) define anabolism and catabolism;

(C) describe conditions needed for metabolism to occur;

(D) explain the process of osmosis and the role it plays in metabolism;

(E) discuss basal metabolism and the factors that affect it;

(F) identify levels of voluntary activity and how these affect the need for kilocalories;

(G) describe metabolic changes and the effect they have on the body during fasting; and

(H) explain why lactic acid builds up in the muscles during exercise and how this can be prevented or treated.

(14) The student explains how food provides energy. The student is expected to:

(A) discuss molecular motion and temperature;

(B) explain heat transfer;

(C) explain latent heat in phase changes;

(D) compare various temperatures on rates of reaction;

(E) analyze how the body uses energy and calories;

(F) describe the relationship of energy to physical and chemical reactions;

(G) analyze relationships between food intake and body weight;

(H) determine energy requirements of individuals using multiple variables such as activity level;

(I) discuss energy imbalances in relationship to weight-related disorders and diseases; and

(J) explain the transfer of energy through a food chain and its relationship to human nutrition.

(15) The student describes the basic nutrients and their specific properties as related to food science. The student is expected to:

(A) identify the recommended daily allowances of the basic nutrients;

(B) list the five main nutrients and food sources of each;

(C) explain the use of the five main nutrients in relation to the Food Guide Pyramid and/or the Dietary Guidelines; and

(D) discuss the importance of fiber in the diet.

(16) The student identifies properties of carbohydrates. The student is expected to:

(A) explain the chemical reaction that occurs when plants produce carbohydrates;

(B) define monosaccharides and disaccharides and name examples of each;

(C) describe the regulation of glucose in the blood and the conditions resulting from low and high glucose levels;

(D) explain sugar hydrolysis and list the products of the hydrolysis of sucrose and lactose;

(E) discuss the process of caramelization;

(F) compare the structures of amylose and amylopectin and how these structures affect cooking properties; and

(G) describe gelatinization, paste, retrogradation, and syneresis.

(17) The student describes the properties of fats and lipids. The student is expected to:

(A) compare the properties of saturated and unsaturated fatty acids;

(B) identify foods containing triglycerides and identify which foods contain saturated and unsaturated fat;

(C) discuss the function of fat in food preparation;

(D) describe ways lipid oxidation can be controlled in food;

(E) describe the functions of fat in the body;

(F) explain the role of fat in maintaining optimum health;

(G) explain the role of cholesterol in maintaining optimum health;

(H) contrast the properties of saturated and unsaturated fats; and

(I) describe the effects of temperature on fats in food preparation.

(18) The student describes the properties of proteins and amino acids. The student is expected to:

(A) name the groups of elements that identify an amino acid;

(B) describe the chemical structure of protein;

(C) explain what happens during the denaturation of protein and how the process occurs;

(D) describe ways in which protein is used in food preparation;

(E) discuss the composition of eggs and their storage requirements;

(F) list factors that affect the stability of an egg foam;

(G) identify the functions of protein in the body; and

(H) compare and contrast complete and incomplete proteins.

(19) The student understands the coagulation and coalescence processes associated with milk protein and cheese. The student is expected to:

(A) list the components of milk and explain how each component is dispersed in the milk;

(B) describe what happens when milk protein is coagulated;

(C) discuss the processing of milk and how it is treated when it is pasteurized, homogenized, and fortified;

(D) compare and contrast skim milk, low-fat milk, whole milk, half-and-half, and various creams;

(E) explain the differences between evaporated milk, condensed milk, and dried milk;

(F) identify factors that affect the ability of cream to form a foam;

(G) explain the changes that occur when milk is heated; and

(H) describe the process of making a fermented or cultured milk product and list examples of these products.

(20) The student analyzes the properties of vitamins and minerals. The student is expected to:

(A) discuss the functions of vitamins and minerals in the body;

(B) describe water- and fat-soluble vitamins and list the main vitamins in each category;

(C) explain why megadoses of fat-soluble vitamins can be toxic;

(D) analyze the food sources for each vitamin and mineral;

(E) analyze deficiency diseases and explain their causes;

(F) explain the difference and list examples of major and trace minerals; and

(G) explain the interrelationships among nutrients.

(21) The student explains the properties of water. The student is expected to:

(A) identify the properties of water that make it a polar molecule;

(B) describe hydrogen bonds and how they differ from covalent bonds;

(C) discuss the differences between hard and soft water;

(D) compare the heat of fusion and the heat of vaporization;

(E) explain the functions of water in food preparation; and

(F) identify the functions of water in the body.

(22) The student analyzes the food irradiation process. The student is expected to:

(A) list the steps in the food irradiation process;

(B) define the units used to measure the amount of radiation used during the irradiation process; and

(C) describe the effects of irradiation on food.

(23) The student discusses United States Department of Agriculture (USDA) packaging guidelines. The student is expected to:

(A) research food packaging guidelines established by the USDA;

(B) explain the rationale and purposes of those guidelines;

(C) describe properties of containers needed for commercial food packaging;

(D) identify factors related to the successful use of controlled-atmosphere packaging; and

(E) describe information required on a food label.

(24) The student analyzes the food dehydration process. The student is expected to:

(A) describe the principles and purposes of dehydration;

(B) describe methods of dehydration and explain their similarities and differences;

(C) explain why food is pretreated before dehydrating;

(D) compare sulfating, sulfuring, and blanching;

(E) describe types of blanching that can be used as pretreatment methods; and

(F) discuss the role of air temperature and movement in successful dehydration.

(25) The student analyzes the food canning process. The student is expected to:

(A) identify safety practices and equipment used in home and commercial canning;

(B) describe hot-pack, cold-pack, and pressure canning;

(C) identify advantages and disadvantages of each canning method;

(D) identify types of food that should be processed by each canning method; and

(E) compare heat transfer by conduction and by convection in canning.

(26) The student analyzes the food freezing process. The student is expected to:

(A) list the steps of the food freezing process;

(B) identify factors needed for successful freezing of food; and

(C) identify advantages and disadvantages of freezing food.

(27) The student understands the importance of developing lifelong skills. The student is expected to:

(A) demonstrate the use of oral and written communication skills such as writing technical reports, letters, and memos; communicating technical information to a nontechnical audience; and making formal and informal presentations;

(B) define a problem, identify potential causes and possible solutions, and make thoughtful recommendations;

(C) apply critical-thinking skills to new situations;

(D) demonstrate the highest standards of professional integrity and ethical values;

(E) work and interact with individuals from diverse cultures;

(F) explain the skills necessary for lifelong learning;

(G) work effectively with others;

(H) provide leadership in a variety of situations;

(I) deal with individual or group conflicts;

(J) research scientific and nonscientific information;

(K) competently use library resources;

(L) manage time effectively;

(M) facilitate group projects;

(N) handle multiple tasks and pressures; and

(O) prepare for a state or national food manager's sanitation certification or alternative credential within the field of food science technology.