Introductory Lesson

Food Science
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Career and Technical Education (CTE)
Career and Technical Education (CTE)

Definition #1:
Career and Technical Education (CTE) instruction aims at developing foundational skills, core workplace competencies, and specific skill competencies in various occupational areas.

Definition #2:
Career and Technical Education (CTE) prepares young people to manage the dual roles of family member and wage earner and enable students to gain entry-level employment in a high-skill, high-wage job and/or to continue their education.
Career and Technical Education (CTE)

Internships, practicum courses, career preparation courses, dual enrollment programs, and apprenticeships are a few venues that deliver career and technical education by providing meaningful opportunities for learners to apply their academic and technical skills.
Career and Technical Education

Historical Side Notes:

In the past, Career and Technical Education (CTE) was organized by program areas, but is now organized by career clusters.

Example:

Family and Consumer Sciences (program area) courses are now located in five career clusters:

- Architecture and Construction (Interior Design courses)
- Arts, AV Technology and Communication (Fashion Design courses)
- Education and Training
- Hospitality and Tourism
- Human Services
Career and Technical Education (CTE)

- You are currently enrolled in the course **Food Science**
- **Food Science** is a CTE course
- You are a CTE student
- I am a CTE instructor
The 16 Career Clusters™

Career Clusters

Agriculture, Food & Natural Resources
Processing, production, distribution, and development of agricultural commodities and natural resources

Engineering & Technology
Designing, managing, building, and maintaining the built environment

Agriculture, Food & Natural Resources
Creating, exhibiting, performing, and publishing multimedia content

Business Management & Administration
Organizing, directing, and evaluating functions essential to productive business operations

Education & Training
Providing education and training services, and related learning support services

Finance
Financial and investment planning, banking, insurance, and business financial management

Forestry & Public Information Services
Executing governmental functions at the local, state, and federal levels

Health Science
Providing diagnostic and therapeutic services, health informatics, support services, and biotechnology research

Hospitality & Tourism
Managing restaurants and other food services, lodging, attractions, recreation events, and travel-related services

Human Services
Providing for families and serving human needs

Information Technology
Designing, supporting, and managing hardware, software, multimedia, and systems integration

Marketing
Performing marketing activities to reach organizational objectives

Manufacturing
Processing materials into intermediate or final products

Public Safety, Corrections & Security
Providing legal, public safety, protective, and homeland security services

Transportation, Distribution & Logistics
Managing movement of people, materials, and goods by road, pipeline, air, rail, and water

Science, Technology, Engineering & Mathematics
Performing scientific research and professional and technical services

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The 16 Career Clusters™

Agriculture, Food & Natural Resources
- Processing, production, distribution, and development of agricultural commodities and natural resources.

Architecture & Construction
- Designing, managing, building, and maintaining the built environment.

A/V Technology & Communications
- Creating, exhibiting, performing, and publishing multimedia content.

Business Management & Administration
- Organizing, directing, and evaluating functions essential to productive business operations.

Criminal Justice, Corrections & Security
- Providing legal, public safety, protective, and homeland security services.

Health Science
- Providing diagnostic and therapeutic services, health informatics, support services, and biotechnology research.

Hospitality & Tourism
- Managing restaurants and other food services, lodging, attractions, recreation events, and travel-related services.

Human Services
- Providing for families and serving human needs.

Information Technology
- Designing, supporting, and managing hardware, software, multimedia, and systems integration.

Marketing
- Performing marketing activities to reach organizational objectives.

Manufacturing
- Processing materials into intermediate or final products.

Public Safety, Corrections & Security
- Providing legal, public safety, protective, and homeland security services.

Science, Technology, Engineering & Mathematics
- Performing scientific research and professional and technical services.

Transportation, Distribution & Logistics
- Managing movement of people, materials, and goods by road, pipeline, air, rail, and water.

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Food Science

Encompasses the management, marketing and operations of restaurants and other food services, lodging, attractions, recreation events and travel related services.

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Sequence of courses available in our district/campus
Hospitality and Tourism Programs of Study

– Restaurants and Food/Beverage Services
– Lodging
– Travel and Tourism
– Recreation, Amusements, and Attractions
Hospitality & Tourism encompasses the management, marketing and operations of restaurants and other food services, lodging, attractions, recreation events and travel related services.

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Career Cluster

Course Title

Programs of Study

Description

Food Science

• Restaurants and Food/BeVERAGE Services
• Lodging
• Travel & Tourism
• Recreation, Amusements & Attractions

Hospitality & Tourism encompasses the management, marketing and operations of restaurants and other food services, lodging, attractions, recreation events and travel related services.
Hospitality & Tourism encompasses the management, marketing and operations of restaurants and other foodservices, lodging, attractions, recreation events and travel related services.

### Sample Career Specialties/Occupations

<table>
<thead>
<tr>
<th>Pathways</th>
<th>Sample Career Specialties/Occupations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General Manager  Food &amp; Beverage Manager  Kitchen Manager  Catering &amp; Banquets Manager  Service Manager  Dining Room Supervisor  Restaurant Owner  Baker  Brewer  Caterer  Dietician  Executive Chef  Cook  Pastry &amp; Specialty Chef  Bartender  Restaurant Server  Banquet Server  Cocktail Server  Banquet Set-Up Employee  Bus Person  Room Service Attendant  Kitchen Steward  Counter Server  Wine Steward  Host  Research and Development Chef  Food/Beverage Wholesaler  Product Demonstrator  Personal Chef</td>
</tr>
<tr>
<td></td>
<td>Front Office Manager  Executive Housekeeper  Director of Sales &amp; Marketing  Chief Engineer  Director of Human Resources  Rooms Division Manager  Director of Security &amp; Controller  Food &amp; Beverage Director  Resident Manager  Director of Operations  General Manager  Regional Manager  Quality Assurance Manager  Corporate Management  Lodging Management  Owner/Franchisee  Uniformed Services Support  Communications Supervisor  Front Desk Supervisor  Reservations Supervisor  Laundry Supervisor  Room Supervisor  Bell Captain  Shift Supervisor  Sales Professional  Night Auditor  Front Desk Employee  Valet Attendant  Bell Attendant  Door Attendant  Concierge  Reservationist  Guestroom Attendant  Public Space Cleaner  House Person  Maintenance Worker  Van Driver</td>
</tr>
<tr>
<td></td>
<td>Executive Director  Assistant Director  Director of Tourism Development  Director of Membership Development  Director of Communications  Director of Visitor Services  Director of Sales  Director of Marketing and Advertising  Director of Volunteer Services  Director of Convention and Visitors Bureau  Market Development Manager  Group Sales Manager  Events Manager  Sales Manager  Destination Manager  Convention Services Manager  Heritage Tourism Developer  Travel Agent (Commercial &amp; Vacation)  Event Planner  Meeting Planner  Special Events Producer  Nature Tourism Coordinator  Tour and Travel Coordinator  Tourism Marketing Specialist  Transportation Specialist  Welcome Center Supervisor  Visitor Center Counselor  Tourism Assistant  Executive Assistant  Tour Guide  Tour Operator  Motor Coach Operator  Tour and Ticket Reservationist  Interpreter</td>
</tr>
<tr>
<td></td>
<td>Club Manager  Club Assistant Manager  Club Instructor  Club Equipment &amp; Facility Maintenance  Club Scheduler  Club Event Planner  Club Membership Developer  Parks &amp; Gardens Director  Parks &amp; Gardens Activity Coordinator  Parks &amp; Gardens Access Management  Parks &amp; Gardens Safety &amp; Security  Parks &amp; Garden Ranger  Resort Trainer  Resort Instructor  Resort Equipment Maintenance  Resort Scheduler  Gaming &amp; Casino Manager  Gaming &amp; Casino Supervisor  Gaming &amp; Casino Dealer  Gaming &amp; Casino Slot Supervisor and Maintenance  Gaming &amp; Casino Security &amp; Safety  Fairs/Festival Event Planner  Fairs/Festival Set up Supervisor  Fairs/Festival Facility Manager  Fairs/Festival Promotional Developer  Theme Parks/Amusement Parks Resale Department Manager  Theme Parks/Amusement Parks Area Retail Manager  Theme Parks/Amusement Parks Area Ride Operations Manager  Theme Parks/Amusement Parks Group Events Manager  Family Centers Manager  Family Centers Equipment Operator/Maintenance  Historical /Cultural/Architectural Ecological Industrial Sites Guides/Ranger  Historical/Cultural/Architectural Ecological Industrial Sites Exhibitor Developer/Museums/Zoos/Aquariums Docent/Museum/Zoos/Aquariums Animal Trainer and Handler  Museums/Zoos/Aquariums Exhibit Developer</td>
</tr>
</tbody>
</table>

### Cluster Knowledge and Skills

- Academic Foundations
- Communications
- Problem Solving and Critical Thinking
- Information Technology Applications
- Systems
- Safety, Health and Environmental
- Leadership and Teamwork
- Ethics and Legal Responsibilities
- Employability and Career Development
- Technical Skills

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2008-2009

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Possible Program of Study
Chef – Head Cook
## Restaurants and Food/Beverage Services

### Cluster Overview:
Encompasses the management, marketing and operations of restaurants and other foodservices, lodging, attractions, recreation events, and travel related services.

### Career Goal (O*NET Code):
Chef and Head Cook (35-1011), Cook, Restaurant (35-2014), Baker, Bread and Pastry (51-3011).

### SUGGESTED COURSEWORK

<table>
<thead>
<tr>
<th>Middle School</th>
<th>HS Courses:</th>
<th>All Courses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 8</td>
<td>English I</td>
<td>(Local districts may list high school credit courses here)</td>
</tr>
<tr>
<td></td>
<td>Math I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Science</td>
<td>World History</td>
</tr>
<tr>
<td></td>
<td>Social Studies</td>
<td>Languages other than English I</td>
</tr>
</tbody>
</table>

### EXTENDED LEARNING EXPERIENCES

<table>
<thead>
<tr>
<th>Student Name:</th>
<th>Student Government</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UIL Academic Competitions</td>
</tr>
<tr>
<td></td>
<td>School Newspaper</td>
</tr>
<tr>
<td></td>
<td>Family, Career and Community Leaders of America (4H)</td>
</tr>
</tbody>
</table>

### COLLEGE CREDIT OPPORTUNITIES -- High School

<table>
<thead>
<tr>
<th>Grade 11</th>
<th>Core Courses:</th>
<th>Career-Related Electives:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>English II</td>
<td>Principles of Hospitality and Tourism</td>
</tr>
<tr>
<td></td>
<td>Geometry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chemistry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>World History</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Languages other than English II</td>
<td></td>
</tr>
</tbody>
</table>

### Extra-Curricular Experiences:
- Language Immersion Programs
- 4-H Youth Development
- School Newspaper
- Student Government
- UIL Academic Competitions
- Yearbook
- DECA
- Family, Career and Community Leaders of America
- SkillsUSA
- Career-Related Electives:
  - Apprenticeship
  - Career Preparation
  - Internship
  - Job Shadowing
  - Service Learning Experiences:
    - Boy Scouts of America
    - Campus Service Organizations
    - Community Service Volunteer
    - Girl Scouts of the USA
    - Peer Mentoring / Peer Tutoring
    - Student Body

### Grade 12

<table>
<thead>
<tr>
<th>Core Courses:</th>
<th>Career-Related Electives:</th>
</tr>
</thead>
<tbody>
<tr>
<td>English IV</td>
<td>Practicum in Culinary Arts or Food Science or Problems and Solutions</td>
</tr>
<tr>
<td>Algebra II</td>
<td></td>
</tr>
<tr>
<td>Environmental Systems</td>
<td></td>
</tr>
<tr>
<td>Government/Economics</td>
<td></td>
</tr>
<tr>
<td>Fine Arts</td>
<td></td>
</tr>
</tbody>
</table>

### College Credit Opportunities
- High School

<table>
<thead>
<tr>
<th>Grade 12</th>
<th>Core Courses:</th>
<th>Career-Related Electives:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>English IV</td>
<td>Principles of Hospitality and Tourism</td>
</tr>
<tr>
<td></td>
<td>Mathematical Models with Applications</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>United States History</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Professional Communications</td>
<td></td>
</tr>
</tbody>
</table>

### Extra-Curricular Experiences:
- Language Immersion Programs
- 4-H Youth Development
- School Newspaper
- Student Government
- UIL Academic Competitions
- Yearbook

### Professional Associations:
- American Culinary Federation
- National Restaurant Association
- Society for Foodservice Management
- Texas Chefs Association
- Texas Restaurant Association
- The Retail Bakers Association

### Culinarian Certificates:
- Culinarian
- Culinary Specialist
- Food Manager
- Journey Baker
- Pastry Culinarian
- OSISA CareerSafe
- ProStart©
- Secondary Culinary Graduate
- Servsafe©
- Texas Chefs Association
- Texas Restaurant Association
- The Retail Bakers Association

### Career Options:
- Pastry Cook
- Prep Cook
- Short-Order Cook
- Food Preparation Worker
- Food Service Specialist
- Chef/Cook Assistant
- Food Preparation Worker
- Corporate Executive Chef
- Caterer
- Culinary Arts Instructor

### Associate Degrees

- Culinary Arts
- Culinary Arts Specialization

### Bachelor Degrees

- Hotel and Restaurant Management
- Restaurant, Hotel, & Institutional Management
- Hospitality Administration
- Hospitality Management

### Graduate Degrees

- Hospitality Administration
- Hospitality Management
- Government/Economics

### Extra-Curricular Experiences:
- Language Immersion Programs
- 4-H Youth Development
- School Newspaper
- Student Government
- UIL Academic Competitions
- Yearbook

### Students may select other elective courses for personal enrichment purposes.

This plan of study serves as a guide, along with other career planning materials, for pursuing a career path and is based on the most recent information as of 2009. All plans meet high school graduation requirements as well as college entrance requirements.
Sample Bachelor Degrees

- Hospitality Administration
- Hospitality Management
- Hotel and Restaurant Management
- Restaurant, Hotel, and Institutional Management
Sample Graduate Degrees

- Hospitality Administration
- Hospitality Management
- Hotel and Restaurant Management
- Restaurant, Hotel, and Institutional Management
Sample Career Options

- Chef/Cook Assistant
- Food Preparation Worker
- Pastry Cook
- Prep Cook
- Short Order Cook
- Baker/Pastry Chef
- Food Service Specialist
- Sous Chef
- Specialty Cook
- Caterer
- Culinary Arts Instructor

- Executive Chef
- Food and Beverage Manager
- Independent Chef/Owner
- Catering/Banquet Manager
- Corporate Executive Chef
- Food and Beverage Controller
- Food and Beverage Director
Lodging Manager
### Lodging

#### SUGGESTED COURSEWORK

<table>
<thead>
<tr>
<th>Middle School</th>
<th>8th</th>
<th>11th</th>
<th>12th</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Courses:</td>
<td>English II</td>
<td>Social Studies</td>
<td>English I</td>
</tr>
<tr>
<td>All Courses:</td>
<td>English II</td>
<td>Social Studies</td>
<td>English I</td>
</tr>
<tr>
<td>Career-Related Electives:</td>
<td>Food Systems</td>
<td>Hospitality and Tourism or Environmental Systems</td>
<td>Hospitality and Tourism or Environmental Systems</td>
</tr>
<tr>
<td>Career-Related Electives:</td>
<td>Food Systems</td>
<td>Hospitality and Tourism or Environmental Systems</td>
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</tbody>
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#### EXTENDED LEARNING EXPERIENCES

<table>
<thead>
<tr>
<th>Career Options:</th>
<th>Hotel Management</th>
<th>Restaurant Management</th>
<th>Office Management</th>
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<td>Career Options:</td>
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<tr>
<td>Career Options:</td>
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<td>Restaurant Management</td>
<td>Office Management</td>
</tr>
</tbody>
</table>

#### COLLEGE CREDIT OPPORTUNITIES – High School

- Hospitality, Management, & Marketing Association
- Hospitality Sales and Technology Association
- Hospitality Financial & Technology Association
- Texas Restaurant Association
- Texas Hotel & Lodging Association
- Hospitality Association of Texas

*Students may earn all or part of these credentials as part of the high school experience.*

#### Curricular Experiences:

- AP, IB, Dual Credit, ATC
- Art, Music, Foreign Language
- Career Technical Education

#### Extracurricular Experiences:

- Future Business Leaders of America
- Family, Career and Community Leaders of America
- DECA
- Business Professionals of America

#### Career Learning Experiences:

- Internship
- Job Shadowing
- Career Preparation

#### Service Learning Experiences:

- Community Service Volunteer
- Service Learning Experiences

- Future Business Leaders of America
- Family, Career and Community Leaders of America
- DECA
- Business Professionals of America

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Sample Bachelor Degrees

- Hospitality Administration
- Hospitality Management
- Hotel and Restaurant Management
- Restaurant, Hotel, and Institutional Management
- Tourism Management
Sample Graduate Degrees

• Hospitality Administration
• Hospitality Management
• Hotel and Restaurant Management
• Restaurant, Hotel, and Institutional Management
• Tourism Management
Sample Career Options

- Bell Attendant
- Concierge
- Front Desk Clerk
- Manager Trainee
- Rooms Division Specialist
- Assistant Executive Housekeeper
- Front Office Assistant Manager
- Hotel Assistant Manager
- Convention Services Manager

- Executive Housekeeper
- Front Office Manager
- Lodging Manager
- Corporate Service Trainer
- Executive Director
- Training and Development Specialist
- Recreations Manager
- Vice President of Operations
TRAVEL AND TOURISM DIRECTORS
## Travel & Tourism

### Cluster Overview
Encompasses the management, marketing and operations of restaurants and other foodservices, lodging, attractions, recreation events, and travel related services.

### Career Goal (O*NET Code):
- Travel Agent (41-3041)
- Private Sector Executive (11-1011)
- Program Director (27-2012)
- Sales Manager (11-2022)
- Tour/Travel Guide (39-6021/22)
- Ticket Agent & Travel Clerk (43-4181)

### SUGGESTED COURSEWORK

#### Middle School
- **8th Grade**
  - HS Courses:
  - Core Courses:
  - Career-Related Electives:

#### High School
- **9th Grade**
  - Core Courses:
  - Career-Related Electives:
- **10th Grade**
  - Core Courses:
  - Career-Related Electives:
- **11th Grade**
  - Core Courses:
  - Career-Related Electives:
- **12th Grade**
  - Core Courses:
  - Career-Related Electives:

### EXTENDED LEARNING EXPERIENCES

- Business Professionals of America
- DECA
- Family, Career and Community Leaders of America
- Future Business Leaders of America

### COLLEGE CREDIT OPPORTUNITIES -- High School

- Students should take Advanced Placement (AP), International Baccalaureate (IB), dual credit, Advanced Technical Credit (ATC), or locally articulated courses (Tech Prep), if possible. List those courses that count for college credit on your campus.
- Career-Related Electives:
  - Practicum in Hospitality and Tourism or Problems and Solutions or Languages other than English IV
Sample Bachelor Degrees

- Hospitality Administration
- Hospitality Management
- Hotel and Restaurant Management
- Restaurant, Hotel, and Institutional Management
- Tourism Management
Sample Graduate Degrees

- Hospitality Administration
- Hospitality Management
- Hotel and Restaurant Management
- Restaurant, Hotel, and Institutional Management
- Tourism Management
Sample Career Options

- Executive Housekeeper
- Front Office Manager
- Lodging Manager
- Corporate Service Trainer
- Executive Director
- Training and Development Specialist
- Recreations Manager
- Vice President of Operations

- Bell Attendant
- Concierge
- Front Desk Clerk
- Manager Trainee
- Rooms Division Specialist
- Assistant Executive Housekeeper
- Front Office Assistant Manager
- Hotel Assistant Manager
- Convention Services Manager
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

Food Science
(3) The student identifies the importance of a well-written business plan. The student is expected to:

(A) categorize a business plan and the need for a well-orchestrated business plan;

(B) research business plan outlines, resources, and templates using web search engines;

(C) explain a marketing plan, including price competition, non-price competition, market analysis, competition, marketing research, market segmentation, demographics, and sales forecasting;
(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.
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)  
Food Science

(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.
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)  
Food Science

(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.
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS) Food Science

(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.
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)  
Food Science

(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.
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS) Food Science

(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.
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)
Food Science

(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.
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)
Food Science

(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.
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)
Food Science

(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) 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.
End of Course Project
Options Food Science
Hospitality & Tourism encompasses the management, marketing and operations of restaurants and other food services, lodging, attractions, recreation events and travel related services.
Resources and References

Websites:
• AchieveTexas
  A college and career initiative designed to help students (and their parents) make wise education choices. It is based on the belief that the curricula of the 21st century should combine rigorous academics and relevant career education.
  http://www.achievetexas.org/in
• Learning that Works for America CTE™
  Sponsored by The National Association of State Directors of Career Technical Education Consortium (NASDCTEc). Aims to support an innovative CTE system that prepares individuals to succeed in education and their careers.
  http://www.careertech.org
• Texas Education Agency
  Texas Essential Knowledge and Skills. The mission of the Texas Education Agency is to provide leadership, guidance and resources to help schools meet the educational needs of all students.
  http://ritter.tea.state.tx.us/rules/tac/chapter130/index.html