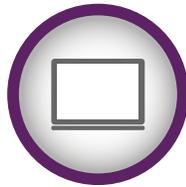


# IOWA CAREER AND TECHNICAL EDUCATION STANDARDS

FINAL REPORT 2019



BUSINESS, MANAGEMENT & ADMINISTRATION • AGRICULTURE, FOOD & NATURAL  
RESOURCES • INFORMATION SOLUTIONS • APPLIED SCIENCES, TECHNOLOGY,  
ENGINEERING & MANUFACTURING • HEALTH SCIENCES • HUMAN SERVICES



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# INTRODUCTION

## Project Need

Career and Technical Education (CTE) in Iowa includes organized educational programs offering a sequence of courses directly related to preparing individuals for employment in current or emerging occupations. These programs include standards-based learning that contribute to an individual's academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, and occupational-specific skills. Each set of Iowa CTE standards periodically undergoes review in response to Governor's Executive Order 83 (Gov. Terry Branstad, 2013), which called for ongoing review of the state's academic standards both to examine the quality of the content and to improve student learning expectations based on public feedback.

Iowa Code chapter 258 mandates the Iowa Department of Education Bureau of CTE to approve all local secondary CTE programs. Accordingly, following extensive review and evaluation of national and state standards and program approval models, the Bureau initiated a standards-based approval process for local CTE programs.

In order to meet regulations as well as needs of stakeholders, the Iowa Department of Education, Bureau of Career and Technical Education (CTE) recognized the need to review and update CTE's state standards. The CTE state standards utilized in Iowa CTE were the starting point for the process of standards review and update.

## Project Participants

Project participants included DOE/CTE program staff, business and industry, Iowa CTE program service area management teams, subject experts, and other educators, Advancing Connections (as contractors), and the public, who reviewed and provided feedback.

## PROCESS

Iowa's Secondary Career and Technical Education (CTE) Taskforce was established as part of House File 604. The Taskforce established several priorities for Secondary CTE, including rigorous standards, consistent and effective program quality across the state, alignment to postsecondary and industry needs, and robust participation from the business community. The previously described mandates and the priorities of the Taskforce were guiding principles in the process for developing and reviewing standards.

At the secondary level, CTE programs are organized within six broad program service areas, as defined in Iowa Code section 256.11, subsection 5, paragraph "h": *The program service areas include agriculture, food, and natural resources; business, finance, marketing, and management; applied sciences, technology, engineering, and manufacturing (including transportation, distribution, logistics, architecture, and construction); health science; human services/family and consumer sciences; and information solutions/information technology.*

The Department of Education Bureau of CTE has established program service area management teams for each broad program service area in the approval process, consisting of teachers, post-secondary instructors, business and industry representatives, and Bureau of CTE staff. These teams played an integral role in the process for standards review by providing oversight and feedback throughout each phase.

The program service area management teams considered the important needs addressed in the charge from the Secondary CTE Taskforce and utilized those principles as guiding factors when developing and reviewing standards. Additionally, the following were important criteria for consideration of standards:

- Research-based;
- Rigor;
- Relevance to industry;
- Promotion of 21st Century Skills.

Iowa's standards in CTE are all closely aligned with the corresponding national standards, which have been developed, reviewed and regularly updated by leaders and practitioners in the program service areas. Participants in the national standards process in each of the program service areas include national CTE leaders and professionals in business and industry, postsecondary education, secondary education, community leaders, parents, students, and the general public. Iowa CTE standards have been reviewed and updated to keep pace with the updates done in each of the national standards.

The following service areas have special considerations impacting the standards process.

- Agriculture, Food and Natural Resources has a special state taskforce that had reviewed and adopted the National Agricultural Education standards.
- Information Technology had recently undergone a rigorous process to review the standards in alignment with legislative needs.
- Applied Sciences, Technology, Engineering, and Manufacturing (including Transportation, Distribution, Logistics, Architecture, and Construction) did not have state standards. The development of initial or pilot standards for the field was the process utilized for this program service area. These voluntary standards will be assessed and adopted for 2020.

The process involved multiple phases and groups in the process for creating standards in career and technical education to encourage student success.

Phase One: Collaboration with Iowa CTE Program Service Areas

Phase Two: Implementation of standards review process for high quality standards

Phase Three: Crosswalking and alignment of the newly revised standards



## PHASE ONE: COLLABORATION

Iowa CTE program service area administrators met with Advancing Connections' contract staff to review current program descriptions and organization, current standards, and current needs. Review of the standards by both Iowa DOE/CTE staff and contractors for analysis of state needs and alignment with national standards was an initial part of the process.



The standards review process in phase one utilized the current standards for each program service area. Project participants reviewed the current standards to ensure that standards are high-quality and meet the following criteria:

- Measurement;
- Focus;
- Synchronization;
- Connectedness;
- Specificity.

For the program service area and pathways in which standards had not already been vetted by the field, standards documents were prepared and shared with the program management teams. For program service areas in which standards had already been vetted by the field, current standards were shared with each of the program service area management teams (PSAMT) for further feedback. From that feedback, revisions were made and then shared again with the PSAMT and consensus was achieved on the revisions that had been made. The PSAMT communicated electronically and met via conference call to discuss the process and reach agreement on the items that had been revised.

The plans for Phases Two and Three were reviewed by the PSAMT and the process was moved to Phase Two.

## PHASE TWO: IMPLEMENTING THE STANDARDS REVIEW PROCESS FOR HIGH QUALITY STANDARDS

A system was established to engage stakeholders to review standards and participate in the process. Stakeholder types included:

- district leaders;
- community colleges;
- business and industry;
- community stakeholders;
- educators; and
- the interested public.



For the standards in each program service area, online surveys were created and distributed widely and were made available to the public through the Iowa Department of Education's website. Review team members were invited and encouraged to help distribute the survey through their own networks. Additionally, the surveys were advertised through press releases, social media and Department newsletters. The surveys were available online May 13 - June 13, 2019 for the public to review. More than 400 responders provided their feedback.

Reviewers were asked to identify both their stakeholder types and the Iowa Area Education Agency (AEA) districts they were from in order to document a broad-based review. Reviewers could provide feedback on each individual standard. They could select to keep the standard as it was written, suggest a revision, or suggest that the standard be eliminated. Reviewers then further could suggest specific revisions and make comments about why a standard should be revised or removed. This provided both quantitative data about stakeholder ratings and standard-specific feedback to be considered.

Stakeholders participated in vetting the CTE standards in all program service areas for which state standards existed. Their feedback was utilized in editing and creating the 2019 CTE Standards presented in this report.

## PHASE THREE: CROSSWALKING AND ALIGNING STANDARDS

The third phase of the project involved creating crosswalks and alignment of standards. A review of all the CTE standards as a whole was conducted to ensure a cross-section of universal standards that would be included in all CTE areas. These Universal Career and Technical Education Standards are present and necessary in all CTE program service areas, clusters, and pathways.



Phase Three also included crosswalking and alignment of Iowa's CTE standards to Iowa's 21st Century Skills. All standards were reviewed for alignment to 21st Century Skills and a crosswalk was created to assist in implementation of standards

## FUTURE PHASES

### Phase Four

During the first two years of implementation, a comprehensive review of standards will take place for all CTE service areas. Each area will update standards based on technical content, clarity, consistency, and innovation within business and industry. During this time all service areas will align and complete a verification process to the Iowa Core for literacy, mathematics, science, and social studies. Additionally, CTE Service Areas will align where appropriate to fine arts and health.

### Phase Five

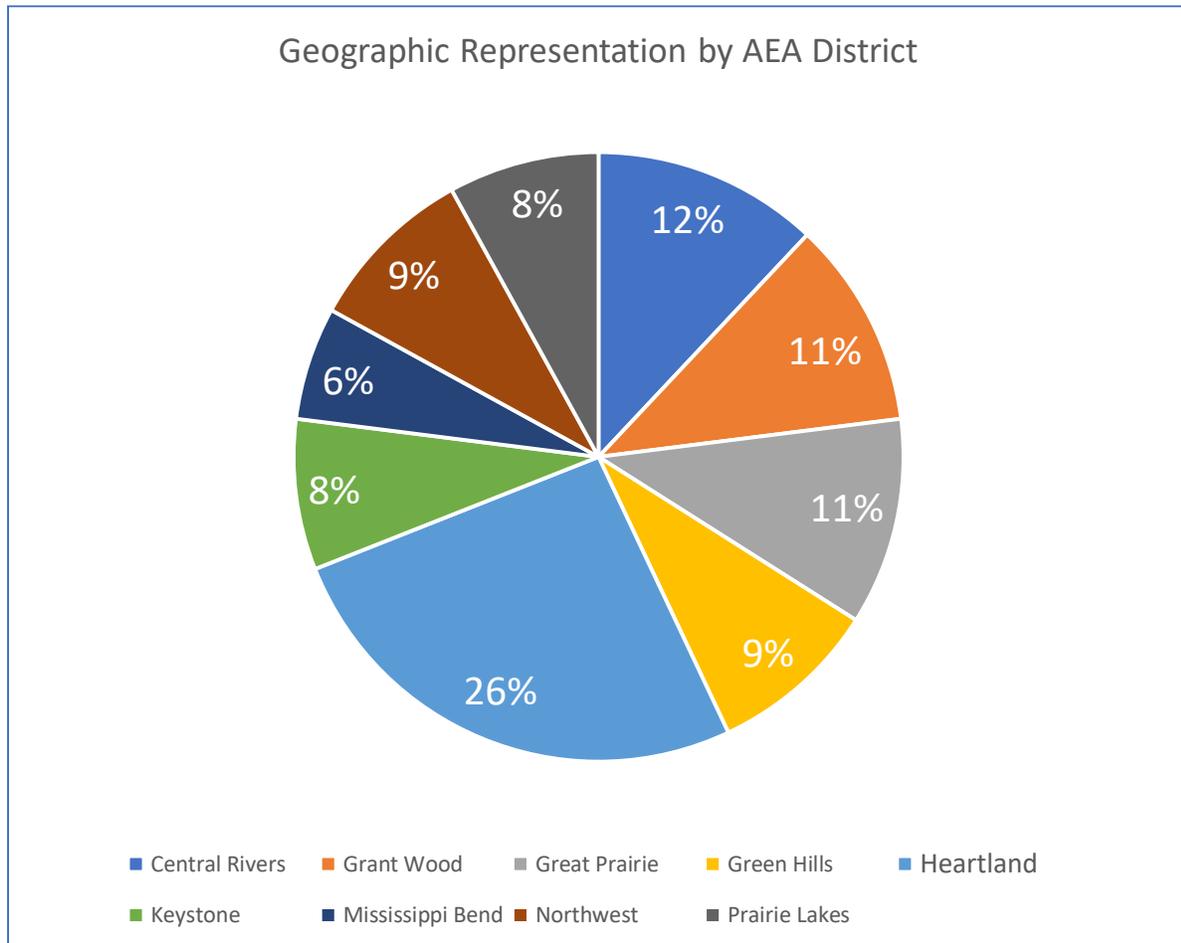
After the first two years of implementation, the service areas will be placed tentatively on a three-year cycle, allowing each area the opportunity to continue to update standards. The timeline can be adjusted to align with any updates to national standards.

## RESULTS

### Stakeholder Participation in Public Review

The review and updating process relies on input from a broad array of stakeholders. All phases of the review process involved diverse groups, with representatives from the businesses and industries relevant to each Service Area, state and local CTE leaders, secondary and postsecondary educators, community leaders, and the general public. The input from these volunteers was fundamental to achieving the project goals.

Over 400 stakeholders participated in the public review of Iowa's CTE standards. Participants represented teachers, administrators, AEA personnel, school counselors, postsecondary educators, business and industry, community leaders, and the general public. To assure broad representation from across the state, reviewers were asked to indicate their AEA district. The graph demonstrates broad geographic participation.



## RECOMMENDATIONS

The CTE standards review process has been completed and the recommended Iowa Standards for CTE for each of the following CTE Program Service Areas have been identified.

### Program Areas

- Agriculture, Food and Natural Resources;
- Business, Finance, Marketing and Management;
- Information Solutions/Information Technology;
- Health Science;
- Human Services/Family and Consumer Sciences.

The process has adequately considered all educator, expert, and public feedback that was received during this review. As a result, the Iowa DOE Bureau of CTE staff puts forth the CTE Standards to the Iowa State Board of Education for adoption.

The Iowa Standards for Applied Sciences, Technology, Engineering and Manufacturing (including Transportation, Distribution, Logistics, Architecture, and Construction) have been compiled. Iowa teachers will pilot these standards during the 2019-2020 school year and provide feedback for finalizing the state standards in these areas during summer 2020. The clusters for this area are:

Architecture and Construction;

Manufacturing;

Science, Technology, Engineering, and Mathematics (STEM);

Transportation, Distribution, and Logistics.

## Iowa CTE Common Standards

After the standards development and review process was completed for each Program Service Area, an analysis was done by the contractors to identify those standards that appeared in all sets of standards. Standards common to all of the CTE program service areas are organized into five topics:

- employability skills;
- career pathways;
- industry impact on society;
- safety in the industry; and
- ethics in the workplace. (Attachment 1)

## 21st Century Alignment

Iowa's 21st Century Skills identify the fundamental knowledge and skills that equip students for successful futures in real world work and life. These skills (civic literacy, employability skills, financial literacy, health literacy, technology literacy) are emphasized in CTE programs. As students advance through CTE programs, they practice and apply these skills contextually within their chosen program areas of study. A complete program of study will include instruction on these essential knowledge and skills that are required for success regardless of one's chosen pathway in a services area. Programs encompass fundamental skills and practices that all students need to acquire to be career ready.

When students complete any CTE program, they demonstrate the knowledge, skills and behaviors that are important to career readiness through contextual experiences in a variety of settings like classrooms, laboratories, Career and Technical Student Organizations (CTSOs), problem, project, and work-based learning, and concurrent enrollment.

The crosswalk showing the 21st century skills and aligned CTE standards helps provide guidance to teacher's on implementation of both CTE standards and 21st Century Skills. The crosswalk is attached. (Attachment 2)

# PROGRAM SERVICE AREA STANDARDS FOR APPROVAL

## **Agriculture, Food and Natural Resources**

The agriculture, food and natural resources (AFNR) industry is a highly technical and ever-changing sector of the global economy upon which everyone is dependent. Strong, relevant AFNR Career and Technical Education (CTE) programs are informed by industry and education stakeholders. The AFNR Career Cluster Content Standards guide what students should know and be able to do after completing a program of study in each of the following AFNR career pathways:

1. Agribusiness Systems;
2. Animal Systems;
3. Biotechnology Systems;
4. Environmental Service Systems;
5. Food Products and Processing Systems;
6. Natural Resource Systems;
7. Plant Systems;
8. Power, Structural and Technical Systems.

The national AFNR Career Cluster Content Standards were originally developed as part of the 2003 United States Department of Education (USDE) Career Clusters Project. In 2009 and again in 2015, the National Council for Agricultural Education undertook a rigorous, multi-stage review involving more than 270 business and industry representatives, educators, and state CTE leaders.

Based on the national AFNR standards, Iowa's AFNR Standards have been independently reviewed and approved by the Governor's Council on Agriculture Education, whose members include the state student leaders and alumni, postsecondary and young adult leaders, educators, agency personnel and legislators. Recommended standards are attached. (Attachment 3)

## **Business, Finance, Marketing and Management**

Programs in the Business, Finance, Marketing and Management clusters help prepare students master the knowledge and skills needed to function as citizens, consumers, employees, managers, business owners and directors of their economic futures through the study of accounting, business law, career development, communication, computation, economics, personal finance, entrepreneurship, information technology, international business, management and marketing. Content standards identify what students should know and be able to do as a result of instruction in any of the business-related clusters. Graduates can either enter the workforce after high school or continue their education at a community college or four-year university. Business programs allow students various opportunities to experience project-, problem- and work-based learning to develop and provide extensive instructional experiences to prepare students for a successful future. The Career Cluster Content Standards provide state and local education leaders and educators with a high-quality, rigorous set of standards to guide what students should know and be able to do after completing a program of study in the following career pathways:

1. Business Management and Administration;
2. Finance;
3. Marketing.

The MBA Research and Curriculum Center used rigorous, research-based, multi-phased procedures to develop model standards for all areas in Business Administration. Iowa developed foundational standards for all business, finance, marketing and management pathways, based on the MBA Research model standards.

The Iowa standards were reviewed by the business program management team and educators. Recommended standards are attached. (Attachment 4)

## Health Science

Health Science secondary education programs prepare students for careers and higher education in more than 200 occupations in the health care field, in a variety of settings, including clinics, home health, hospitals, insurance industry, laboratories and research, nursing homes, and elder care facilities. Graduates can either enter the workforce after high school or continue their education at a community college or four-year university. Many courses can be concurrently enrolled with a local community college. Health Science programs allow students varied opportunities to experience classroom and laboratory components and instruction that meets industry validated standards, work-based learning in the form of internships or academies, and membership in HOSA, the student-led organization that enhances the skills taught in Health Science and provides opportunities to build leadership and competitive skills necessary in the world of work and in the community.

The Career Cluster Content Standards provide state and local education leaders and educators with a high-quality, rigorous set of standards to guide what students should know and be able to do after completing a program of study in each of the following career pathways:

1. Healthcare Professionals;
2. Therapeutic Services;
3. Health Informatics;
4. Support Services.

Iowa has developed foundational standards that all Health Science programs would use and cluster-specific standards for the programs in the Health Science clusters that would be used by local programs to build their program(s) for specific clusters.

Health Science standards are based on the 2019 National Consortium for Health Sciences Education standards. The standards have been through the standards review process and are aligned with industry needs. The recommended standards are attached. (Attachment 5)

## Human Services/Family and Consumer Sciences

Human Services/Family & Consumer Sciences programs offer a unique focus on families, work, and their interrelationships, providing a solid foundation of success for any student. The essential knowledge and skills developed through Human Services/Family & Consumer Sciences programs prepare students for a successful future in many fields, as well as in family and community life. Graduates can either enter the workforce after high school or continue their education at a community college or four-year university. Many courses can be concurrent enrolled courses with a local community college. Human Services/Family & Consumer Sciences programs allow students varied opportunities to experience classroom and laboratory components and instruction that meets industry validated standards, work-based learning in the form of internships or academies, and membership in the Family, Career and Community Leaders of America (FCCLA) the student-led organization that "enhances" the skills taught in FCS, and provides opportunities to build leadership and competitive skills necessary in the world of work and in the community. The Career Cluster Content Standards provide state and local education leaders and educators with sets of high-quality, rigorous standards to guide what students should know and be able to do after completing a program of study in the following career pathways:

1. Foundational Standards for all Human Services/Family and Consumer Sciences Pathways;
2. Human and Family Services;
3. Hospitality, Food Production, and Nutrition Services;
4. Housing, Fashion and Design;
5. Education and Training.

The standards for Human Services pathways are based on the Family and Consumer Sciences National Standards 3.0. The standards have been reviewed and revised based on industry needs for Iowa. The recommended standards are attached. (Attachment 6)

## Information Solutions/Information Technology

The Information Technology industry is a dynamic and entrepreneurial field that continues to have a revolutionary impact on the economy and on the world. Careers in Information Technology involve the design, development, support and management of hardware, software, multimedia and systems integration services and are available in every sector of the economy. Students in information technology learn and practice skills that prepare them for diverse post-high school education and training opportunities, from apprenticeships and two-year college programs to four-year college and graduate programs. Many courses can be concurrent enrolled courses with a local community college.

Iowa's Information Technology programs all include foundational/core standards that define business concepts and tools, technical skills, and communication skills. The foundational standards and benchmarks have been updated and modernized by a team of IT experts from Iowa's community colleges, four-year public and private colleges and universities, Iowa STEM Council, the Technology Association of Iowa, and business and industry. The team also developed standards for the four career pathways within this cluster and service area, building on the core fundamentals, Information Technology pathways include:

1. Network Systems;
2. Information Support and Services;
3. Web and Digital Communications;
4. Programming and Software Development.

Standards developed by the Computer Science Teachers Association (CSTA) are integrated into Iowa's State Standards for Information Technology. They are identified by including the CSTA standards number at the end of the standards statement (in parentheses). Information Technology standards have been reviewed by the program management team along with educators and other experts. Recommended standards are attached. (Attachment 7)

Iowa's Career and Technical Education (CTE) is organized around six Service Areas and aligned with the national Career Clusters Framework. The five being reviewed are:

- Agriculture, Food and Natural Resources;
- Business, Finance, Marketing and Management;
- Health Science;
- Human Services and Family and Consumer Sciences;
- Information Solutions.

Career pathway programs in each of the identified service areas integrate technical and academic knowledge and skill development with work-based learning experiences to better prepare students to succeed in college and careers. An analysis of the standards in each pathway yield the following standards that are universal to all the pathways in Iowa's six CTE Service Areas.

<b>UNIVERSAL CAREER AND TECHNICAL STANDARDS</b>
<b>Employability Skills</b>
Demonstrate transferable knowledge, attitudes, and technical and employability skills in school, community and workplace settings.
Demonstrate job seeking and job keeping skills.
Demonstrate employability skills, work ethics, and professionalism.
Demonstrate teamwork and leadership skills in the family, workplace, and community.
Create an environment that encourages and respects the ideas, perspectives, and contributions of all group members.
<b>Career Pathways</b>
Analyze career paths within industries.
Explain roles and functions of individuals engaged in related careers.
Analyze opportunities for employment and entrepreneurial endeavors.
Summarize education and training requirements and opportunities for career paths.
Analyze the role of professional organizations, credentials, certifications, and degrees in related careers.
Analyze potential career choices to determine the knowledge, skills, attitudes, and opportunities associated with each career.

<b>UNIVERSAL CAREER AND TECHNICAL STANDARDS</b>
<b>Industry Impact on Society</b>
Analyze the impact of the industry on local, state, national, and global economies.
Examine how the industry improves society.
Identify how the industry and related technology impacts individuals, society, and the environment.
Evaluate the effects of technology on individual and family resources in a global context.
<b>Safety in the Industry</b>
Demonstrate safety and sanitation procedures for a clean and safe environment.
Summarize federal and state regulations regarding safe handling, usage, and storage of chemicals.
Apply Occupational Safety and Health Administration (OSHA) regulations to safety procedures for the industry.
Apply safety and security procedures as required by Hazard Analysis and Critical Control Point (HACCP), Occupational Safety and Health Administrations (OSHA), and other agencies.
Students apply safety practices in the lab and on worksites.
Demonstrate safe practices and procedures with tools and equipment.
Demonstrate appropriate use of personal protective equipment.
Document safety concerns according to local policies and procedures.
<b>Ethics in the Workplace</b>
Analyze state and federal policies and laws providing consumer protection.
Utilize sound decision-making principles.
Model ethical behavior in the classroom and workplace setting.
<b>Industry Impact on Society</b>
Analyze the impact of the industry on local, state, national, and global economies.
Examine how the industry improves society.
Identify how the industry and related technology impacts individuals, society, and the environment.
Evaluate the effects of technology on individual and family resources in a global context.

<b>Crosswalk: Iowa CTE Universal Core Standards and Iowa K-12 21<sup>st</sup> Century Skills</b>		
<b>Universal Core Career and Technical Education Standards</b>		<b>21<sup>st</sup> Century</b>
<b>U-1</b>	<b>Employability Skills</b>	
U-1.1	Demonstrate transferable knowledge, attitudes, and technical and employability skills in school, community and workplace settings.	ES.3
U-1.2	Demonstrate job seeking and job keeping skills.	ES.2
U-1.3	Demonstrate employability skills, work ethics, and professionalism.	ES.4, ES.5
U-1.4	Demonstrate teamwork and leadership skills in the family, workplace, and community.	ES.1, ES.2
U-1.5	Create an environment that encourages and respects the ideas, perspectives, and contributions of all group members.	ES.2, CL.2
<b>U-2</b>	<b>Career Pathways</b>	
U-2.1	Analyze career paths within industries.	ES.4
U-2.2	Explain roles and functions of individuals engaged in related careers.	ES.2
U-2.3	Analyze opportunities for employment and entrepreneurial endeavors.	ES.4
U-2.4	Summarize education and training requirements and opportunities for career paths.	ES.4
U-2.5	Analyze the role of professional organizations, credentials, certifications, and degrees in related careers.	ES.4, ES.5, CL.1
U-2.6	Analyze potential career choices to determine the knowledge, skills, attitudes, and opportunities associated with each career.	ES.4
<b>U-3</b>	<b>Industry Impact on Society</b>	
U-3.1	Analyze the impact of the industry on local, state, national, and global economies.	TL.1
U-3.2	Examine how the industry improves society.	TL.3
U-3.3	Identify how the industry and related technology impacts individuals, society, and the environment.	TL.1, TL.4
U-3.4	Evaluate the effects of technology on individual and family resources in a global context.	TL.4

<b>Universal Core Career and Technical Education Standards</b>		<b>21<sup>st</sup> Century</b>
<b>U-4</b>	<b>Safety in the Industry</b>	
U-4.1	Demonstrate safety and sanitation procedures for a clean and safe environment.	HL.5, CL.1
U-4.2	Summarize federal and state regulations regarding safe handling, usage, and storage of chemicals.	HL.1
U-4.3	Apply Occupational Safety and Health Administration (OSHA) regulations to safety procedures for the industry.	HL.2
U-4.4	Apply safety and security procedures as required by Hazard Analysis and Critical Control Point (HACCP), Occupational Safety and Health Administrations (OSHA), and other agencies.	HL.2, CL.1
U-4.5	Students apply safety practices in the lab and on worksites.	HL.3, CL.1
U-4.6	Demonstrate safe practices and procedures with tools and equipment.	HL.3, CL.1
U-4.7	Demonstrate appropriate use of personal protective equipment.	HL.3, CL.1
U-4.8	Document safety concerns according to local policies and procedures.	HL.4, CL.1
<b>U-5</b>	<b>Ethics in the Workplace</b>	
U-5.1	Analyze state and federal policies and laws providing consumer protection.	ES.2
U-5.2	Utilize sound decision-making principles.	ES.4
U-5.3	Model ethical behavior in the classroom and workplace setting.	ES.3
U-5.4	Analyze the impact of the industry on local, state, national, and global economies.	ES.2
U-5.5	Examine how the industry improves society.	TL.4
U-5.6	Identify how the industry and related technology impacts individuals, society, and the environment.	TL.4
U-5.7	Evaluate the effects of technology on individual and family resources in a global context.	ES.3, TL.4

Crosswalk of Iowa K-12 21 <sup>st</sup> Century Skills and Iowa CTE Universal Core Standards		
Iowa K-12 21 <sup>st</sup> Century Skills		CTE Universal Core Standards
<b>ES</b>	<b>Employability Skills</b>	
ES.1	Communicate and work productively with others, incorporating different perspectives and cross-cultural understanding, to increase innovation and the quality of work.	U-1.4
ES.2	Adapt to various roles and responsibilities and work flexibly in climates of ambiguity and changing priorities.	U-1.2, U-1.4, U-1.5, U-2.2, U-5.1, U-5.4
ES.3	Demonstrate leadership skills, integrity, ethical behavior, and social responsibility while collaborating to achieve common goals.	U-1.1, U-5.3, U-5.7
ES.4	Demonstrate initiative and self-direction through high achievement and lifelong learning while exploring the ways individual talents and skills can be used for productive outcomes in personal and professional life.	U-2.1, U-2.3, U-2.4, U-2.5, U-2.6, U-5.2
ES.5	Demonstrate productivity and accountability by meeting high expectations.	U-2.5
<b>HL</b>	<b>Health Literacy</b>	
HL.1	Demonstrate functional health literacy skills to obtain, interpret, understand and use basic health concepts to enhance personal, family, and community health.	U-4.2
HL.2	Synthesize interactive literacy and social skills to establish and monitor personal, family and community goals related to all aspects of health.	U-4.3, U-4.4
HL.3	Apply critical literacy/thinking skills related to personal, family and community wellness.	U-4.5, U-4.6, U-4.7
HL.4	Use media literacy skills to analyze media and other influences to effectively manage health risk situations and advocate for self and others.	U-4.8
HL.5	Demonstrate behaviors that foster healthy, active lifestyles for individuals and the benefit of society.	U-4.1

<b>Iowa K-12 21<sup>st</sup> Century Skills</b>		<b>CTE Universal Core Standards</b>
<b>TL</b>	<b>Technology Literacy</b>	
TL.1	Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.	U-3.1, U-3.3
TL.2	Use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.	
TL.3	Apply digital tools to gather, evaluate, and use information.	U-3.2
TL.4	Demonstrate critical thinking skills using appropriate tools and resources to plan and conduct research, manage projects, solve problems and make informed decisions.	U-3.3, U-3.4, U-5.5, U-5.6, U-5.7
<b>CL</b>	<b>Civil Literacy</b>	
CL.1	Analyze civic and political institutions.	U-2.5
CL.2	Apply civic virtues and democratic principles.	U-1.5
CL.3	Interpret processes, rules and laws.	U-4.1, U-4.4, U-4.5, U-4.6, U-4.7, U-4.8

## State Standards – Iowa, 2019 Universal CTE Standards

Iowa K-12 21st Century Skills		Agriculture	Business, Finance, Marketing, Management	Information Technology	Health Science	Human Services, Family & Consumer Sciences
<b>EMPLOYABILITY SKILLS (ES)</b>						
ES.1	Communicate and work productively with others, incorporating different perspectives and cross-cultural understanding, to increase innovation and the quality of work.	CRP04, CRP08, CRP12, NRS02.05	2.1 - 2.7, 3.1, 5.1, 5.3 - 5.6, 12.2	1.3, 3.1, 3.3, 3.4, 6.7, 8-1	2.1.1, 2.1.2, 2.1.4, 2.1.5 2.3.1 – 2.3.3, 4.2.1, 6.2.1, 8.1.1, 8.1.2, 8.2.1 – 8.2.3	1.1, 2.2, 3.3, 3.5, 11.14, 12.9, 13.4, 13.5
ES.2	Adapt to various roles and responsibilities and work flexibly in climates of ambiguity and changing priorities.	CRP01.03, CRP02.01, CRP02.02	2.2, 2.3, 2.6, 3.1- 3.3, 5.1-5.10, 9.1, 9.3, 11.5, 11.9, 12.1, 12.2, 12.6	2.2.4, 3.4, 6.1.2, 7-1.1	4.1.1, 4.2.1, 5.1.1, 5.2.1, 5.2.1 - 5.2.7, 8.1.1, 8.2.1	2.1, 2.2, 2.3, 3.1, 7.0, 11.16, 13.1, 13.2
ES.3	Demonstrate leadership skills, integrity, ethical behavior, and social responsibility while collaborating to achieve common goals.	CRP01.01, CRP06.02, CRP09	1.1, 2.1 - 2.7, 3.1- 3.3, 4.2, 4.4, 4.5, 5.1-5.10, 6.1, 7.2, 7.8, 8.1, 8.2, 9.1, 9.3, 9.4, 10.1, 11.1 - 11.7, 11.9,	1.7, 2.6.2, 3.4, 6.7.3, 8-2.1.6, 8-4.1.1	4.1.1, 4.2.1, 5.1, 6.1.1, 6.1.2, 6.2.1, 6.2.2, 8.1.1, 8.1.2, 8.2.1 - 8.2.3	2.2, 3.3, 3.4, 3.5, 3.6, 10.2, 11.14, 12.12, 13.1, 13.3, 13.4, 13.5

## State Standards – Iowa, 2019 Universal CTE Standards

<b>Iowa K-12 21st Century Skills</b>		<b>Agriculture</b>	<b>Business, Finance, Marketing, Management</b>	<b>Information Technology</b>	<b>Health Science</b>	<b>Human Services, Family &amp; Consumer Sciences</b>
ES.4	Demonstrate initiative and self-direction through high achievement and lifelong learning while exploring the ways individual talents and skills can be used for productive outcomes in personal and professional life.	CRP06.01, CRP10, CS02, CS05	2.1, 2.3, 2.5, 2.6, 3.1, 3.2, 4.5, 5.1- 5.10, 7.3, 7.7, 9.1, .93, 11.5, 12.1-12.6	1.2, 1.5, 2.2	2.1.1, 4.3.1, 4.3.2, 4.4.1, 4.4.2, 8.2.2, 10.1.2	1.1, 2.2, 2.3, 7.2, 10.2, 10.4, 12.8, 13.2, 13.5
ES.5	Demonstrate productivity and accountability by meeting high expectations.	CRP02	1.1, 2.1-2.7, 3.1- 3.3, 4.5, 5.1-5.10, 7.2, 9.1, 9.3, 9.4, 10.1, 11.2, 11.4, 11.5, 12.1, 12.2	1.2, 2.6, 3.3.4, 6.1, 7-1	2.1.1, 2.1.4, 2.3.1, 2.3.2, 2.3.3, 4.1.1, 4.2.1, 8.2.1, 8.2.2, 8.2.3	2.1, 2.2, 3.6, 9.2, 9.3, 7.1, 11.14, 11.15, 11.16, 12.4, 13.3

## State Standards – Iowa, 2019 Universal CTE Standards

Iowa K-12 21st Century Skills		Agriculture	Business, Finance, Marketing, Management	Information Technology	Health Science	Human Services, Family & Consumer Sciences
<b>HEALTH LITERACY (HL)</b>						
HL.1	Demonstrate functional health literacy skills to obtain, interpret, understand and use basic health concepts to enhance personal, family, and community health.	CRP03, CRP03.01	3.1, 5.1, 5.4, 5.5, 5.7, 5.8, 5.10, 7.8, 11.2-11.5, 12.1	3.2, 3.4	1.1.2, 2.1.1, 2.2.1, 3.1.4, 9.1.1, 9.1.2, 9.1.3, 9.1.4, 9.2.1	2.1, 2.3, 3.1, 6.1, 6.2, 9.1, 9.2, 10.4, 13.3
HL.2	Synthesize interactive literacy and social skills to establish and monitor personal, family and community goals related to all aspects of health.	CRP05.01	2.3, 3.1, 3.2, 5.1, 5.3-5.10, 7.2, 7.3, 7.8, 9.1,9.3, 11.2, 11.5, 12.2, 12.4, 12.5	2.5, 3.1, 3.2	2.1.1, 2.1.2, 2.3.1, 8.2.3	3.1, 3.6, 4.1, 6.1, 11.8, 11.12
HL.3	Apply critical literacy/thinking skills related to personal, family and community wellness.	CRP01.02, CS03.03	3.2, 5.3, 5.4, 5.7, 5.9, 5.10, 7.7, 12.2	1.5, 1.7, 2.2	2.1.1, 2.1.2, 2.3.1, 8.2.3	2.1, 3.3, 3.5, 3.6, 6.4, 7.1, 7.2, 10.3, 11.1
HL.4	Use media literacy skills to analyze media and other influences to effectively manage health risk situations and advocate for self and others.	CRP05	2.5, 2.7, 7.8, 10.1	1.1, 1.8, 4.6, 6.5	2.3.1, 2.3.3	3,3, 5.3, 6.3
HL.5	Demonstrate behaviors that foster healthy, active lifestyles for individuals and the benefit of society.	CRP01, CS03, AS01.03, AS07.02, ESS.02, NRS02.01	2.2, 2.3, 3.1, 3.2, 5.1-5.4, 5.6, 5.7, 5.10, 7.3, 7.8, 9.1, 11.2-11.5, 12.1, 12.2		9.1.1, 9.1.2, 9.1.3, 9.1.4, 9.2.1,	2.1, 2.3 3.1, 3.3, 3.4, 3.6, 6.3, 7.1, 7.3, 7.5, 9.4

## State Standards – Iowa, 2019 Universal CTE Standards

Iowa K-12 21st Century Skills		Agriculture	Business, Finance, Marketing, Management	Information Technology	Health Science	Human Services, Family & Consumer Sciences
<b>CIVIC LITERACY (CL)</b>						
CL.1	Analyze civic and political institutions.	CRP01.03	4.2, 4.4, 5.3		3.1.1, 3.1.2, 3.1.4	1.1, 2.3
CL.2	Apply civic virtues and democratic principles.	CRP01, CRP01.03	2.7, 3.3, 4.2, 4.4, 5.3	6.7	6.1.1, 6.1.2, 6.2.1, 6.2.2	2.1, 2.3, 3.6, 7.8, 13.3
CL.3	Interpret processes, rules and laws.	CS01	1.1, 1.2, 4.2, 4.4, 5.3, 11.2, 11.4, 11.9	1.7	5.1.1, 5.2.1 – 5.2.6 7.3.1, 7.4.1, 7.4.2, 7.5.1, 7.5.2, 11.1.4	5.3, 6.1, 6.3, 6.4, 7.2, 7.3, 7.5, 7.8, 9.1, 9.2, 10.1, 10.2, 11.1, 11.2, 13.3, 13.5
<b>FINANCIAL LITERACY (FL)</b>						
FL.1	Develop financial and career goals.	CRP03.02, CRP10, CS05	5.2, 7.2, 7.3, 7.4, 12.3	1.5, 2.2	4.3.1, 4.3.2, 4.4.1, 4.4.2	1.1, 2.1, 2.2, 7.7, 12.8, 13.2
FL.2	Create a savings and spending plan.	CRP03.02	7.2, 7.3, 7.4, 7.5			2.1, 7.1, 7.6, 7.7, 11.6
FL.3	Analyze credit and debt levels.		7.1, 7.3			7.6, 7.7, 10.4, 11.6
FL.4	Evaluate savings and long-term investments.	CRP03.02	7.2, 7.3, 7.6			7.6, 7.7, 10.3, 11.6
FL.5	Measure risk management tools.		7.8			7.3, 7.6, 7.7, 10.3, 11.6

## State Standards – Iowa, 2019 Universal CTE Standards

Iowa K-12 21st Century Skills		Agriculture	Business, Finance, Marketing, Management	Information Technology	Health Science	Human Services, Family & Consumer Sciences
<b>TECHNOLOGY LITERACY (TL)</b>						
TL.1	Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.	CRP06, CRP11, ABS 04.02, BS03.01, BS03.02, BS03.05, PST01, PST04	2.7, 4.5, 9.1, 9.3, 10.1, 11.5, 13.3	2.5, 2.5, 2.6, 2.8, 4.2, 4.5, 5.2, 5.3	4.1.1, 2.3.3	8.1, 11.9, 12.5, 12.6, 12.9
TL.2	Use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.	CRP07	2.4, 2.7, 9.1, 9.3, 9.4	2.5, 3.3, 3.4, 4.5, 6.5	2.3.3, 4.2.1, 4.4.2,	2.2, 7.4, 11.4
TL.3	Apply digital tools to gather, evaluate, and use information.	CRP07.02, CS02.01, BS02.01, ESS01.01, NRS04.02, PST05	2.4, 2.6, 2.7, 4.5, 7.3, 9.1, 9.3, 9.4, 10.1, 11.4-11.6, 11.10, 13.1	1.6, 1.9, 2.2, 3.2, 3.3, 3.5, 5.1, 7-4.2, 8-5.2	1.3.1, 2.3.3, 10.1.1, 11.1.1 – 11.1.3	10.4, 11.3, 11.10, 11.15

## State Standards – Iowa, 2019 Universal CTE Standards

<b>Iowa K-12 21st Century Skills</b>		<b>Agriculture</b>	<b>Business, Finance, Marketing, Management</b>	<b>Information Technology</b>	<b>Health Science</b>	<b>Human Services, Family &amp; Consumer Sciences</b>
TL.4	Demonstrate critical thinking skills using appropriate tools and resources to plan and conduct research, manage projects, solve problems and make informed decisions.	CS01.01, BS01.02, BS02, BS03, ESS05.02	2.1-2.5, 2.7, 3.2, 4.4, 4.5, 5.3, 5.8, 9.1, 9.3, 9.4, 10.1, 11.5, 11.6, 11.10, 12.2	2.2, 2.6, 2.5, 2.8, 4.12, 6.1, 7-4.2	2.3.1, 8.1.2, 8.2.1, 8.2.2, 8.2.3, 11.1.3	2.2, 3.3, 6.5, 11.15, 12.6
TL.5	Understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.	CRP11.02, CS01.02, CS02.02	2.7, 3.3, 5.6, 9.1, 9.3, 9.4, 11.4, 11.9	1.7, 1.8, 4.11, 4.12, 6.4, 5.6, 7.2, 7-4.2	7.3.1, 5.1.2, 6.1.1 – 6.1.2	1.1, 3.3, 4.2, 5.4, 6.5, 7.4, 7.5, 11.16
TL.6	Demonstrate a sound understanding of technology concepts, systems and operations.	BS.01, PST01.02, PST02	1.2, 2.4, 2.7, 3.3, 4.5, 8.2, 9.1-9.4, 11.4, 11.6, 11.10	1.9, 2.1, 2.3, 2.6 – 2.8 4.1, 4.2, 4.4, 4.5 4.9 – 4.12, 7.7.3	2.3.3, 10.1.1, 11.1.1 - 11.1.3	11.16

## Career Ready Practices Content Standards

**CRP.01. Act as a responsible and contributing citizen and employee.**

Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

**CRP.01.01. Model personal responsibility in the workplace and community.**

CRP.01.01.01.a. Define personal responsibility and distinguish how it applies in workplace and community (e.g., make educated choices, listen and follow directions, ask for help when needed, meet expected standards, etc.).

CRP.01.01.02.a. Distinguish personal levels of responsibility, which can be applied in the workplace and community.

CRP.01.01.01.b. Analyze and predict how personal responsibility impacts the workplace and community.

CRP.01.01.02.b. Assess personal level of responsibility and examine opportunities for improvement.

CRP.01.01.01.c. Evaluate past workplace and community situations and determine how personal responsibility positively or negatively impacted outcomes.

CRP.01.01.02.c. Model personal responsibility in workplace and community situations.

**CRP.01.02. Evaluate and consider the near-term and long-term impacts of personal and professional decisions on employers and community before taking action.**

CRP.01.02.01.a. Classify the near- and long- term impacts of personal decisions on self and others (e.g., decisions involving health, relationships, money, perceptions, education, etc.).

CRP.01.02.02.a. Classify professional decisions by their near- and long-term impact on employers and community (e.g., decisions involving: financials, business goals, processes, customer satisfaction, corporate image, etc.).

CRP.01.02.01.b. Assess the pros and cons of personal decisions based on their anticipated impact on self and others.

CRP.01.02.02.b. Analyze the pros and cons of professional decisions based upon impact on employers and community.

CRP.01.02.01.c. Make and defend personal decisions after analyzing their near- and long-term impacts on self and others.

CRP.01.02.02.c. Make and defend professional decisions after evaluating their near- and long-term impacts on employers and community.

<b>Career Ready Practices Content Standards</b>
CRP.01.03. Identify and act upon opportunities for professional and civic service at work and in the community.
CRP.01.03.01.a. Define and categorize opportunities for professional service at work and in the community (e.g., serve on committees, attend meetings, etc.).
CRP.01.03.02.a. Identify civic service opportunities in workplaces and the community (e.g., organizations, fundraising, etc.).
CRP.01.03.01.b. Assess available professional service opportunities at workplaces and in community (e.g., trainings, organizing events, etc.).
CRP.01.03.02.b. Assess available civic service opportunities at workplaces and in the community (e.g., community events, attend meetings, etc.).
CRP.01.03.01.c. Devise, implement, and evaluate strategies for involvement in professional service opportunities at work and in the community (e.g., coaching/mentorship, presentations at meetings, etc.).
CRP.01.03.02.c. Devise, implement, and evaluate strategies for personal involvement in civic service at work and in the community (e.g., volunteer at food pantry, community clean-up, join organizations or committees, etc.).
<b>CRP.02. Apply appropriate academic and technical skills. Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.</b>
CRP.02.01. Use strategic thinking to connect and apply academic learning, knowledge and skills to solve problems in the workplace and community.
CRP.02.01.01.a. Distinguish opportunities to apply academic learning to solve problems in the workplace (e.g., identify how to: increase productivity, reduce costs, lower inputs, etc.).
CRP.02.01.02.a. Distinguish opportunities to apply academic learning to solve problems in the community (e.g., identify how to: stop businesses from closing, increase access to emergency services, eliminate hunger, reduce unemployment, etc.).
CRP.02.01.01.b. Assess workplace problems and identify the most appropriate academic knowledge and skills to apply.
CRP.02.01.02.b. Assess community problems and identify the most appropriate academic knowledge and skills to apply.
CRP.02.01.01.c. Apply academic knowledge and skills to solve problems in the workplace and reflect upon the results achieved.
CRP.02.01.02.c. Apply academic knowledge and skills to solve problems in the community and reflect upon results achieved.
CRP.02.02. Use strategic thinking to connect and apply technical concepts to solve problems in the workplace and community.

<b>Career Ready Practices Content Standards</b>
CRP.02.02.01.a. Identify opportunities to apply technical concepts to solve problems in the workplace (e.g., identify how to: increase sales, better customer service, reduce inputs, reduce waste, ensure sustainability, etc.).
CRP.02.02.02.a. Identify opportunities to apply technical concepts to solve problems in the community (e.g., identify how to: ensure safe routes to schools, reduce vandalism, reduce air pollution, etc.).
CRP.02.02.01.b. Assess workplace problems and distinguish the most appropriate technical concepts to apply.
CRP.02.02.02.b. Assess community problems and identify the most appropriate technical concepts to apply.
CRP.02.02.01.c. Apply technical concepts to solve problems in the workplace and reflect upon the results achieved.
CRP.02.02.02.c. Apply technical concepts to solve problems in the community and reflect upon results achieved.
<b>CRP.03 Attend to personal health and financial well-being.</b> Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.
<b>CRP.03.01. Design and implement a personal wellness plan.</b>
CRP.03.01.01.a. Examine and summarize components in a personal wellness plan (e.g., healthy diet, exercise, mental health activities, etc.).
CRP.03.01.02.a. Research the impact of personal wellness plans in workplaces and/or communities.
CRP.03.01.01.b. Assess the risks and benefits of implementing a personal wellness plan.
CRP.03.01.02.b. Analyze the relationship between personal wellness and workplace performance.
CRP.03.01.01.c. Create, implement and continually evaluate a personal wellness plan.
CRP.03.01.02.c. Evaluate personal wellness plans in workplace and community organizations and the effectiveness of the plans.
<b>CRP.03.02. Design and implement a personal financial management plan.</b>
CRP.03.02.01.a. Research and examine components in a personal financial management plan (e.g., income, expense, budgeting, savings, credit, etc.).
CRP.03.02.02.a. Examine and categorize personal financial practices (e.g., earning, spending, use of management tools, credit, etc.).
CRP.03.02.01.b. Analyze management tools available for managing personal finances (e.g., software, calendars, banks, financial institutions, etc.).

<b>Career Ready Practices Content Standards</b>
CRP.03.02.02.b. Analyze the effectiveness of a personal financial management plan and explain how this practice may contribute to future financial independence.
CRP.03.02.01.c. Appraise and select management tools to include in a personal financial management plan.
CRP.03.02.02.c. Design, implement and evaluate a personal financial management plan.
<b>CRP.04. Communicate clearly, effectively and with reason.</b> Career-ready individuals communicate thoughts, ideas and action plans with clarity, whether using written, verbal and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.04.01. Speak using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.
CRP.04.01.01.a. Identify and categorize strategies for ensuring clarity, logic, purpose and professionalism in verbal and non-verbal communication (e.g., vocal tone, organization of thoughts, eye contact, preparation, etc.).
CRP.04.01.02.a. Examine and assess personal ability to speak with clarity, logic, purpose and professionalism in formal and informal settings (e.g., speeches, interviews, presentations, oral reports, etc.).
CRP.04.01.01.b. Analyze use of verbal and non-verbal communication strategies in workplace situations.
CRP.04.01.02.b. Apply strategies for speaking with clarity, logic, purpose and professionalism in a variety of situations in formal and informal settings.
CRP.04.01.01.c. Evaluate other's verbal and non-verbal communications (e.g., speeches, presentations, oral reports, etc.) and propose recommendations for improvement in clarity, logic, purpose and professionalism.
CRP.04.01.02.c. Evaluate personal strengths and areas for growth with regard to speaking formally and informally with clarity, logic, purpose and professionalism, and identify ways to improve.
CRP.04.02. Produce clear, reasoned and coherent written and visual communication in formal and informal settings.
CRP.04.02.01.a. Research and summarize the purpose of different forms of written and visual communication in formal and informal settings (e.g., letters, emails, reports, social media, graphics, diagrams, etc.).

<b>Career Ready Practices Content Standards</b>
CRP.04.02.02.a. Identify and examine methods for producing clear, reasoned and coherent written and visual communication that are appropriate to the task, purpose and audience (e.g., audience analysis, objective development, etc.).
CRP.04.02.01.b. Compare and contrast the structure of different forms of written and visual communication.
CRP.04.02.02.b. Apply techniques for ensuring clarity, logic and coherence to edit written and visual communications (e.g., emails, reports, presentations, technical documents, diagrams, etc.).
CRP.04.02.01.c. Evaluate the effectiveness of different forms of written and visual communication for achieving their intended purpose.
CRP.04.02.02.c. Compose clear and coherent written documents and visuals (e.g., agendas, audio-visuals, drafts, forms, etc.) that are adapted to the audience needs in both formal and informal settings.
CRP.04.03. Model active listening strategies when interacting with others in formal and informal settings.
CRP.04.03.01.a. Research and summarize components of active listening (e.g., eye contact, have an open mind, restate, etc.).
CRP.04.03.02.a. Observe and identify use of active listening strategies in formal (e.g., speeches, presentations, etc.) and informal (e.g., conversations, meetings, etc.) settings.
CRP.04.03.01.b. Apply active listening strategies (e.g., be attentive, observe non-verbal cues, ask clarifying questions, etc.).
CRP.04.03.02.b. Apply and evaluate personal level of active listening strategies in formal and informal settings.
CRP.04.03.01.c. Evaluate personal effectiveness and devise a plan to improve active listening skills.
CRP.04.03.02.c. Model active listening strategies in formal and informal settings.
<b>CRP.05. Consider the environmental, social and economic impacts of decisions. Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organizations and the environment. They are aware of and utilize new technologies, understandings, procedures, materials and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.</b>
CRP.05.01. Assess, identify and synthesize the information and resources needed to make decisions that positively impact the workplace and community.
CRP.05.01.01.a. Examine and describe the steps in the decision-making process used in the workplace and community.
CRP.05.01.02.a. Examine and explain the relationship between information, resources and good decision making in workplace and community situations.

<b>Career Ready Practices Content Standards</b>
CRP.05.01.03.a. Classify the types of information (e.g., data, research, procedures, regulations, etc.) and resources (e.g., human, financial, technology, time, etc.) that maybe used to make workplace and community decisions.
CRP.05.01.01.b. Analyze how the process of decision making is used in workplace and community situations.
CRP.05.01.02.b. Analyze past workplace and community situations to determine if appropriate information and resources were used to make an effective decision.
CRP.05.01.03.b. Analyze workplace and community decisions and assess the information and resources used to make those decisions.
CRP.05.01.01.c. Evaluate workplace and community decision-making processes and devise strategies for improvement.
CRP.05.01.02.c. Evaluate workplace and community situations and recommend the information and resources needed to support good decisions.
CRP.05.01.03.c. Synthesize information and resources and apply to workplace and community situations to make positive decisions.
<b>CRP.05.02. Make, defend and evaluate decisions at work and in the community using information about the potential environmental, social and economic impacts.</b>
CRP.05.02.01.a. Examine areas in the workplace and community where decisions will make a positive impact.
CRP.05.02.02.a. Examine information about environmental, social and economic impacts when making decisions in the workplace and community.
CRP.05.02.01.b. Apply a structured decision-making process to improve workplace and community situations.
CRP.05.02.02.b. Assess past decisions made in workplace and community and analyze their effects on environmental, social and economic situations.
CRP.05.02.01.c. Evaluate and defend decisions applied in the workplace and community situations.
CRP.05.02.02.c. Evaluate workplace and community situations and propose decisions to be made based upon the positive impact made on environment, social and economic areas.
<b>CRP.06. Demonstrate creativity and innovation.</b> Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization
CRP.06.01. Synthesize information, knowledge and experience to generate original ideas and challenge assumptions in the workplace and community.

<b>Career Ready Practices Content Standards</b>
CRP.06.01.01.a. Identify and summarize steps for generating ideas used in the workplace and community.
CRP.06.01.02.a. Define “assumption” and identify different types and sources of assumptions that could impact effectiveness in workplace and community situations.
CRP.06.01.01.b. Synthesize information, knowledge and experiences to generate ideas for workplace and community situations.
CRP.06.01.02.b. Analyze how assumptions can impact outcomes in a variety of workplace and community situations.
CRP.06.01.01.c. Evaluate workplace and community situations and devise strategies to apply original ideas.
CRP.06.01.02.c. Devise and apply strategies (e.g., ask questions, brainstorm ideas, present facts and information etc.) to challenge common assumptions in workplace and community situations.
<b>CRP.06.02. Assess a variety of workplace and community situations to identify ways to add value and improve the efficiency of processes and procedures.</b>
CRP.06.02.01.a. Identify and categorize the types of processes and procedures used in workplaces and the community (e.g., health and safety, email, compliance, etc.).
CRP.06.02.02.a. Identify and summarize methods used to increase efficiency and add value to workplace and community processes and procedures (e.g., individual input, scheduled reviews, etc.).
CRP.06.02.01.b. Analyze how processes and procedures are implemented in workplace and community situations (e.g., employee evaluations, vacation, leave time, etc.).
CRP.06.02.02.b. Predict and communicate potential gains in efficiency and value-added from implementing an improved process or procedure.
CRP.06.02.01.c. Evaluate past workplace and community situations and determine how processes and procedures impacted outcomes.
CRP.06.02.02.c. Construct and implement methods to improve workplace and community processes and procedures.
<b>CRP.06.03. Create and execute a plan of action to act upon new ideas and introduce innovations to workplace and community organizations.</b>
CRP.06.03.01.a. Examine workplace and community situations to identify opportunities for improvement through the introduction of new ideas and innovations.
CRP.06.03.02.a. Identify individuals and organizations (i.e., stakeholders) that need to provide input and feedback on new ideas or innovation prior to implementation in the workplace or community.
CRP.06.03.01.b. Assess and communicate the risks and benefits of applying new ideas and innovations to the workplace and community.
CRP.06.03.02.b. Elicit and assimilate input and feedback from individuals and organizations about new ideas or innovations for the workplace or community.

<b>Career Ready Practices Content Standards</b>
CRP.06.03.01.c. Design a plan of action to introduce a new idea or innovation into the workplace and community.
CRP.06.03.02.c. Evaluate and execute strategies for using stakeholder input and feedback to improve a plan of action for introducing a new idea or innovation into the workplace or community.
<b>CRP.07. Employ valid and reliable research strategies.</b> Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use a reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices. They use an informed process to test new ideas, information and practices in their workplace situation.
CRP.07.01. Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.
CRP.07.01.01.a. Identify and summarize reliable research processes and methods used to generate data for decision-making.
CRP.07.01.02.a. Identify the data requirements for potential decisions in the workplace and community and determine possible research strategies to use to generate the necessary data.
CRP.07.01.01.b. Analyze how different research methods are used to generate data in a variety of situations.
CRP.07.01.02.b. Assess the positives and negatives of using different research strategies and methods to generate data for workplace and community decisions and use this information to select appropriate methods.
CRP.07.01.01.c. Evaluate business' and organizations' use of research methods and processes and propose recommendations for improvement.
CRP.07.01.02.c. Design plans for use and implementation of reliable research methods to generate data for decision making in workplace and community situations.
CRP.07.02. Evaluate the validity of sources and data used when considering the adoption of new technologies, practices and ideas in the workplace and community.
CRP.07.02.01.a. Identify and summarize types of data sources available to research new technologies and practices for workplaces and community organizations (e.g., blog, research, news, etc.).
CRP.07.02.02.a. Categorize potential technologies, practices and ideas that could be adopted by workplaces and community organizations.
CRP.07.02.01.b. Assess data sources for reliability and validity.
CRP.07.02.02.b. Assimilate data to assist in making a decision about the adoption of a new technology, practice or idea by workplaces and community organizations.
CRP.07.02.01.c. Propose valid and reliable data sources to use when considering the adoption of new technologies, practices and ideas.

<b>Career Ready Practices Content Standards</b>
CRP.07.02.02.c. Create and defend proposals for new technologies, practices and ideas using valid and reliable data sources.
<b>CRP.08. Utilize critical thinking to make sense of problems and persevere in solving them. Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem. They thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.</b>
CRP.08.01. Apply reason and logic to evaluate workplace and community situations from multiple perspectives.
CRP.08.01.01.a. Identify and summarize steps to think critically (e.g., identify problem, gather information, brainstorm solutions, etc.).
CRP.08.01.02.a. Examine and identify opportunities to apply reason, logic and multiple perspectives to solve problems in workplace and community situations.
CRP.08.01.01.b. Apply steps for critical thinking to a variety of workplace and community situations.
CRP.08.01.02.b. Assess solutions to workplace and community problems for evidence of reason, logic and consideration of multiple perspectives.
CRP.08.01.01.c. Evaluate how applying critical thinking skills can impact workplace and community situations.
CRP.08.01.02.c. Devise and implement strategies to apply reason, logic and input from multiple perspectives to solve workplace and community problems.
<b>CRP.08.02. investigate, prioritize and select solutions to solve problems in the workplace and community.</b>
CRP.08.02.01.a. Investigate and summarize potential tools and resources used to solve problems in the workplace and community.
CRP.08.02.02.a. Identify and summarize steps in the decision-making process to solve workplace and community problems.
CRP.08.02.01.b. Assimilate and prioritize potential solutions to solve problems in the workplace and community.
CRP.08.02.02.b. Apply decision-making processes to generate possible solutions to solve workplace and community problems.
CRP.08.02.01.c. Devise and implement strategies to evaluate the effectiveness of solutions for resolving workplace and community problems.
CRP.08.02.02.c. Evaluate and select solutions with greatest potential for success to solve workplace and community problems.

<b>Career Ready Practices Content Standards</b>
CRP.08.03. Establish plans to solve workplace and community problems and execute them with resiliency.
CRP.08.03.01.a. Identify different types of problem-solving models and summarize their applicability to workplace and community situations.
CRP.08.03.02.a. Identify and analyze the elements of a plan for solving workplace and community problems (e.g., budget, timeline, etc.).
CRP.08.03.01.b. Analyze and determine the best problem-solving model to apply to workplace and community problems.
CRP.08.03.02.b. Create plans to solve workplace and community problems.
CRP.08.03.01.c. Evaluate the effectiveness of different problem-solving models for reaching a solution to workplace and community issues.
CRP.08.03.02.c. Implement and evaluate plans to solve workplace and community problems.
<b>CRP.09. Model integrity, ethical leadership and effective management.</b> Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem. They thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.09.01. Model characteristics of ethical and effective leaders in the workplace and community (e.g. integrity, self-awareness, self-regulation, etc.).
CRP.09.01.01.a. Identify and summarize the characteristics of ethical and effective leaders in workplace and community settings.
CRP.09.01.02.a. Reflect upon and summarize situations where ethical and effective leadership characteristics were needed and/ or personally demonstrated (e.g., motivation, empathy, etc.).
CRP.09.01.01.b. Analyze workplace and community leaders and determine what ethical and effective leadership characteristics they demonstrate.
CRP.09.01.02.b. Conduct a self-assessment of personal ethical and effective leadership characteristics (e.g., relates to others, focused, integrity, etc.) and reflect upon the results to identify opportunities for improvement.
CRP.09.01.01.c. Evaluate ethical and effective leadership characteristics demonstrated by others.
CRP.09.01.02.c. Model characteristics and actions of ethical and effective leaders in workplace and community situations (e.g., integrity, self-awareness, etc.).
CRP.09.02. implement personal management skills to function effectively and efficiently in the workplace (e.g., time management, planning, prioritizing, etc.).

<b>Career Ready Practices Content Standards</b>
CRP.09.02.01.a. Identify and summarize personal management skills necessary to function effectively in the workplace (e.g., time management, planning, prioritizing, etc.).
CRP.09.02.02.a. Examine and describe personal management skills (e.g., time management, prioritizing, setting goals, etc.) that are individually implemented and demonstrated in workplace and community situations.
CRP.09.02.01.b. Analyze leaders’ use of effective personal management skills and determine how they apply them in workplace and community situations.
CRP.09.02.02.b. Conduct a self-assessment of personal management skills used in daily workplace or community situations.
CRP.09.02.01.c. Evaluate opportunities to apply personal management skills into daily tasks and responsibilities.
CRP.09.02.02.c. Model personal management skills and identify opportunities for continuous improvement.
CRP.09.03. Demonstrate behaviors that contribute to a positive morale and culture in the workplace and community (e.g., positively influencing others, effectively communicating, etc.).
CRP.09.03.01.a. Identify and summarize respectful and purposeful behaviors that contribute to positive morale and culture in workplace and community settings (e.g., positively influencing others, effectively communicating, etc.).
CRP.09.03.02.a. Examine personal levels of respectful and purposeful behaviors and summarize how they are demonstrated (e.g., treat others with respect, model professionalism, etc.).
CRP.09.03.01.b. Analyze the relationship between demonstrating respectful and purposeful behaviors (e.g., collaborative, clear expectations, etc.) and increased influence in the workplace and community.
CRP.09.03.02.b. Devise, implement and evaluate strategies for continuation and improvement of respectful and purposeful behaviors that contribute to positive morale and culture in workplace and community (e.g., recognize others’ skills, promote collaboration, etc.).
CRP.09.03.01.c. Evaluate workplace and community cultures and determine specific behaviors and actions that contribute to building the morale and culture.
CRP.09.03.02.c. Model respectful and purposeful behaviors that contribute to positive morale and culture in the workplace and community (e.g., effectively communicating, recognizing accomplishments of others, etc.).

<b>Career Ready Practices Content Standards</b>
<p><b>CRP.10. Plan education and career path aligned to personal goals.</b> Career-ready individuals take personal ownership of their own educational and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the educational and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors and other experts to assist in the planning and execution of career and personal goals.</p>
<p>CRP.10.01. Identify career opportunities within a career cluster that match personal interests, talents, goals and preferences.</p>
<p>CRP.10.01.01.a. Determine personal interests, talents, goals and preferences for potential careers.</p>
<p>CRP.10.01.02.a. Examine career clusters and identify potential career opportunities based on personal interests, talents, goals and preferences.</p>
<p>CRP.10.01.01.b. Assess and select areas for growth and improvement based upon analysis of personal interests for potential careers.</p>
<p>CRP.10.02.02.b. Create goals for personal improvement and continuous growth in a career area.</p>
<p>CRP.10.02.01.c. Devise and implement plans to complete the requirements for career advancement.</p>
<p>CRP.10.02.02.c. Evaluate actions taken and make appropriate modifications to continuous growth goals in career areas.</p>
<p>CRP.10.03. Develop relationships with and assimilate input and/or advice from experts (e.g., counselors, mentors, etc.) to plan career and personal goals in a chosen career area.</p>
<p>CRP.10.03.01.a. Summarize ways that input and/or advice from career area experts could assist in planning personal career goals.</p>
<p>CRP.10.03.02.a. Identify trusted individuals to consult with on setting and achieving career and personal goals (e.g., counselors, teachers, mentors, coaches, community leaders, etc.).</p>
<p>CRP.10.03.01.b. Assess career and personal goals and determine additional information career area experts could provide.</p>
<p>CRP.10.03.02.b. Devise and implement strategies to gather input and advice for planning career and personal goals from trusted experts.</p>
<p>CRP.10.03.01.c. Devise strategies to gather answers and information from career area experts and use this information to plan and execute goals.</p>
<p>CRP.10.03.02.c. Assimilate input and advice from experts and formulate plans to implement into career and personal goals for chosen career areas.</p>
<p>CRP.10.04. identify, prepare, update and improve the tools and skills necessary to pursue a chosen career path.</p>

<b>Career Ready Practices Content Standards</b>
CRP.10.04.01.a. Identify and explain the purpose of fundamental tools used to pursue a career path (e.g., resume, cover letter, portfolio, etc.) as well as the common components of each (e.g., content in cover letter, categories in resume, etc.).
CRP.10.04.02.a. Summarize common processes involved in pursuing a career (e.g., interviews, applications, networking, etc.) and the appropriate tools used for completing each.
CRP.10.04.01.b. Organize personal information (e.g., goals, experiences, education, achievements, work examples, etc.) to prepare and continuously update a set of tools to aid in the pursuit of a career path.
CRP.10.04.02.b. Examine and practice the skills needed to complete common processes for pursuing a career (e.g., ability to communicate about past experiences, ability to articulate one’s goals and career objectives, etc.).
CRP.10.04.01.c. Select and use appropriate tools to pursue career advancement opportunities and assimilate feedback from the process to identify improvements for the future.
CRP.10.04.02.c. Apply skills to complete common processes involved in pursuing a career and assimilate input and feedback from experts (e.g., mentors, teachers, business persons, etc.) to improve.
<b>CRP.11. Use technology to enhance productivity.</b> Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring and using new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks – personal and organizational – of technology applications, and they take actions to prevent or mitigate these risks.
CRP.11.01. Research, select and use new technologies, tools and applications to maximize productivity in the workplace and community.
CRP.11.01.01.a. Identify and summarize new technologies, tools and applications to use in workplace and community situations.
CRP.11.01.02.a. Examine and categorize opportunities in workplace and community settings to use new technologies, tools and applications to maximize productivity and efficiency.
CRP.11.01.01.b. Analyze advantages and disadvantages of new technologies, tools and applications to maximize productivity in the workplace and community.
CRP.11.01.02.b. Select, apply and use new technologies, tools and applications in workplace and community situations to maximize productivity.
CRP.11.01.01.c. Construct effective communications to explain the features, benefits and risks of new technologies, tools and applications in the workplace and community.
CRP.11.01.02.c. Evaluate effectiveness and make recommendations for using new technologies, tools and applications in the workplace and community.
<b>Career Ready Practices Content Standards</b>

CRP.11.02. Evaluate personal and organizational risks of technology use and take actions to prevent or minimize risks in the workplace and community.
CRP.11.02.01.a. Identify and summarize potential personal and organizational risks of using technology in the workplace and community.
CRP.11.02.02.a. Synthesize tools and processes to prevent or minimize risks of technology use in community and work settings (e.g., risk management tools, benefit risks, etc.).
CRP.11.02.01.b. Assess the physical, financial and professional risks associated with using technology in the workplace and community and use this information to determine appropriate uses of technology.
CRP.11.02.02.b. Analyze the effectiveness of methods for preventing or minimizing the risks of technology use.
CRP.11.02.01.c. Construct and implement methods to evaluate personal and organizational risks of technology in workplace and community settings.
CRP.11.02.02.c. Design and implement strategies to prevent or minimize the risks of technology use in the workplace and community.
<b>CRP.12. Work productively in teams while using cultural/global competence. Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural differences to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.</b>
CRP.12.01. Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.
CRP.12.01.01.a. Differentiate the strengths and talents of all team members needed to complete projects in the workplace and community.
CRP.12.01.02.a. Identify and summarize techniques to build consensus in a team situation.
CRP.12.01.03.a. Identify and categorize components of cultural and global competence (e.g., awareness, attitude, understanding cultural differences, etc.).
CRP.12.01.01.b. Formulate action plans to complete team-oriented projects in the workplace and community, including plans for personal contributions.
CRP.12.01.02.b. Apply consensus building techniques to accomplish results in team-oriented situations.
CRP.12.01.03.b. Assess the need and benefit for cultural and global competency and apply these competencies in team settings at work and in the community.
CRP.12.01.01.c. Evaluate the effectiveness of team-oriented projects at work and in the community and make recommendations for future improvements.
CRP.12.01.02.c. Devise and implement methods to obtain feedback from team members on their experiences after completing workplace and community projects.
CRP.12.01.03.c. Evaluate personal level of cultural and global competence and implement plans for growth and improvement in workplace and community situations.

### Career Ready Practices Content Standards

CRP.12.02. Create and implement strategies to engage team members to work toward team and organizational goals in a variety of workplace and community situations (e.g., meetings, presentations, etc.).
CRP.12.02.01.a. Identify and summarize effective strategies used to engage team members to accomplish goals.
CRP.12.02.02.a. Examine and summarize workplace and community situations where it is important to engage team members to meet team and organizational goals (e.g., meetings, presentations, etc.).
CRP.12.02.01.b. Assess team dynamics and match strategies to increase team member engagement.
CRP.12.02.02.b. Select strategies to engage team members and apply in a variety of situations.
CRP.12.02.01.c. Create and implement novel strategies to engage team members based on the situation.
CRP.12.02.02.c. Evaluate the effectiveness of strategies to engage team members in a variety of workplace and community situations.

<b>Agriculture, Food and Natural Resources Cluster Skills</b>
<b>CS.01. Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food &amp; Natural Resources Career Cluster.</b>
CS.01.01. Research, examine and discuss issues and trends that impact AFNR systems on local, state, national and global levels.
CS.01.01.01.a. Examine historical and current data to identify issues impacting AFNR systems.
CS.01.01.02.a. Research and summarize trends impacting AFNR systems.
CS.01.01.01.b. Analyze and summarize AFNR issues and their impact on local, state, national and global levels.
CS.01.01.02.b. Analyze current trends in AFNR systems and predict their impact on local, state, national and global levels.
CS.01.01.01.c. Evaluate and explain AFNR issues and their impacts to audiences with limited AFNR knowledge.
CS.01.01.02.c. Evaluate and explain emerging trends and the opportunities they may create within the AFNR systems.
<b>CS.01.02. Examine technologies and analyze their impact on AFNR systems.</b>
CS.01.02.01.a. Research technologies used in AFNR systems.
CS.01.02.02.a. Compare and contrast AFNR systems before and after the integration of technology.
CS.01.02.01.b. Apply appropriate use of technologies in AFNR workplace scenarios.
CS.01.02.02.b. Analyze how technology is used in AFNR systems to maximize productivity.
CS.01.02.01.c. Solve problems in AFNR workplaces or scenarios using technology.
CS.01.02.02.c. Evaluate the importance of technology use and how it impacts AFNR systems.
<b>CS.01.03. Identify public policies and examine their impact on AFNR systems.</b>
CS.01.03.01.a. Summarize public policies affecting AFNR systems.
CS.01.03.02.a. Identify influential historical and current public policies that impact AFNR systems.
CS.01.03.01.b. Analyze and assess at least two public policies that impact each AFNR system.
CS.01.03.02.b. Create and propose a hypothetical policy that will impact current AFNR systems.
CS.01.03.01.c. Evaluate a public policy within AFNR systems and defend or challenge it.
CS.01.03.02.c. Create a plan for implementing a new public policy that will positively impact AFNR systems.
<b>CS.02. Evaluate the nature and scope of the Agriculture, Food &amp; Natural Resources Career Cluster and the role of agriculture, food and natural resources (AFNR) in society and the economy.</b>
CS.02.01. Research and use geographic and economic data to solve problems in AFNR systems.

<b>Agriculture, Food and Natural Resources Cluster Skills</b>
CS.02.01.01.a. Research and describe different types of geographic data used in AFNR systems.
CS.02.01.02.a. Identify and examine economic data related to AFNR systems (e.g., commodity markets, food marketing, food and nutritional assistance programs, etc.).
CS.02.01.01.b. Analyze and interpret AFNR related geographic data using a variety of systems and technologies (e.g., GIS, GPS, etc.).
CS.02.01.02.b. Analyze and interpret a set of economic data and explain how it impacts an AFNR system.
CS.02.01.01.c. Evaluate geographic data and select necessary data sets to solve problems within AFNR systems.
CS.02.01.02.c. Devise a strategy to solve a problem in an AFNR system using a set of economic data.
<b>CS.02.02. Examine the components of the AFNR systems and assess their impact on the local, state, national and global society and economy.</b>
CS.02.02.01.a. Identify and summarize the components within AFNR systems (e.g., Animal Systems: health, nutrition, genetics, etc.; Natural Resources Systems: soil, water, etc.).
CS.02.02.02.a. Define and summarize societies on local, state, national and global levels and describe how they relate to AFNR systems.
CS.02.02.03.a. Examine and summarize the components of the agricultural economy (e.g., environmental, crops, livestock, etc.).
CS.02.02.01.b. Assess components within AFNR systems and analyze relationships between systems.
CS.02.02.02.b. Assess how people within societies on local, state, national and global levels interact with AFNR systems on daily, monthly or yearly basis.
CS.02.02.03.b. Assess the economic impact of an AFNR system on a local, state, national and global level.
CS.02.02.01.c. Devise and implement a strategy for explaining components of AFNR systems to audiences with limited knowledge.
CS.02.02.02.c. Evaluate how society traditions, customs or policies have resulted from practices with AFNR systems.
CS.02.02.03.c. Evaluate how positive or negative changes in the local, state, national or global economy impacts AFNR systems.
<b>CS.03. Examine and summarize the importance of health, safety and environmental management systems in AFNR workplaces.</b>
<b>CS.03.01. Identify and explain the implications of required regulations to maintain and improve safety, health and environmental management systems.</b>
CS.03.01.01.a. Research and explain the implications of regulatory, safety and health standards on AFNR systems (e.g., SDS, bioterrorism, etc.)

<b>Agriculture, Food and Natural Resources Cluster Skills</b>
CS.03.01.02.a. Summarize the importance of safety, health and environmental management in the workplace.
CS.03.01.01.b. Execute health, safety and environmental procedures to comply with regulatory and safety standards.
CS.03.01.02.b. Analyze existing required regulations within an AFNR workplace.
CS.03.01.01.c. Evaluate how AFNR organizations/businesses promote improved health, safety and environmental management and determine steps to maintain compliance with regulatory and safety standards in AFNR situations.
CS.03.01.02.c. Construct and implement methods to evaluate compliance with required safety, health and environmental management regulations.
CS.03.02. Develop and implement a plan to maintain and improve health, safety and environmental compliance and performance.
CS.03.02.01.a. Research and identify components required in health and safety performance plans.
CS.03.02.02.a. Examine and categorize examples of environmental compliance plans from AFNR workplace.
CS.03.02.01.b. Analyze the effectiveness of health and safety performance plans of an AFNR workplace.
CS.03.02.02.b. Develop plans to improve environmental compliance and performance within an AFNR system.
CS.03.02.01.c. Create and implement a plan to improve safety, health and environmental management regulations in an AFNR workplace.
CS.03.02.02.c. Devise and implement a strategy to educate employees on environmental compliance and performance in an AFNR workplace.
CS.03.03. Apply health and safety practices to AFNR workplaces.
CS.03.03.01.a. Research and summarize the purposes and objectives of health and safety policies and procedures relevant to AFNR careers.
CS.03.03.02.a. Identify emergency response procedures for health and safety issues at AFNR workplaces.
CS.03.03.03.a. Examine and categorize examples of how to avoid health or safety risks in AFNR workplaces.
CS.03.03.04.a. Examine and categorize the risk level of contamination or injury as associated with AFNR tasks in the workplace.
CS.03.03.01.b. Analyze and evaluate the impact of current health and safety practices of AFNR workplaces.
CS.03.03.02.b. Assess various emergency response plan requirements for an AFNR workplaces and/or facility.
CS.03.03.03.b. Assess and apply first aid knowledge and procedures relevant to AFNR workplaces.

<b>Agriculture, Food and Natural Resources Cluster Skills</b>
CS.03.03.04.b. Assess the safety priorities and select appropriate responses for different levels of contamination or injury at an AFNR workplace.
CS.03.03.01.c. Create and implement a health and safety policy plan for AFNR workplaces.
CS.03.03.02.c. Create and implement a plan to communicate appropriate responses for health and safety situations within an AFNR workplace.
CS.03.03.03.c. Conduct a survey and evaluate results of AFNR workplaces to identify structure of health and safety practices and number of employees certified in first aid training.
CS.03.03.04.c. Create a plan to mitigate the level of contamination or injury identified as a risk in the workplace.
<b>CS.03.04. Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.</b>
CS.03.04.01.a. Identify and differentiate the appropriate protective equipment for the safe use and operation of specific tools and equipment (e.g. PPE, etc.).
CS.03.04.02.a. Identify standard tools, equipment and safety procedures related to AFNR tasks.
CS.03.04.03.a. Read and interpret operating instructions related to operation, storage and maintenance of tools and equipment related AFNR tasks.
CS.03.04.01.b. Analyze and demonstrate adherence to protective equipment requirements when using various AFNR tools and equipment.
CS.03.04.02.b. Complete the set up and adjustment for tools and equipment related to AFNR tasks.
CS.03.04.03.b. Assess and demonstrate appropriate operation, storage and maintenance techniques for AFNR tools and equipment.
C3.06.04.01.c. Design and implement plans to ensure the use of appropriate protective equipment when using various AFNR tools and equipment.
C3.06.04.02.c. Evaluate and select appropriate tools and equipment to complete AFNR tasks.
C3.06.04.03.c. Devise and implement operation, storage and maintenance plans or schedules for AFNR tools and equipment.
<b>CS.04. Demonstrate stewardship of natural resources in AFNR activities.</b>
<b>CS.04.01. Identify and implement practices to steward natural resources in different AFNR systems.</b>
CS.04.01.01.a. Define stewardship of natural resources and distinguish how it connects to AFNR systems.
CS.04.01.02.a. Read and interpret the definition of sustainability and summarize how it relates to AFNR activities.
CS.04.01.01.b. Analyze available practices to steward natural resources in AFNR systems (e.g., wildlife and land conservation, soil and water practices, ecosystem management, etc.).
CS.04.01.02.b. Analyze and assess sustainability practices that can be applied in AFNR systems (e.g., energy efficiency, recycle/reuse/repurpose, green resources, etc.).

<b>Agriculture, Food and Natural Resources Cluster Skills</b>
CS.04.01.01.c. Devise strategies for stewarding natural resources at home and within community.
CS.04.01.02.c. Evaluate sustainability policies and plans and prepare summary of potential improvements for AFNR businesses or organizations.
CS.04.02. Assess and explain the natural resource related trends, technologies and policies that impact AFNR systems.
CS.04.02.01.a. Research and examine historical and current natural resources trends and technologies.
CS.04.02.02.a. Research and summarize influential historical and current natural resources policies that impact AFNR systems.
CS.04.02.01.b. Analyze natural resources trends and technologies and explain how they impact AFNR systems (e.g., climate change, green technologies, water resources, etc.).
CS.04.02.02.b. Create and defend a hypothetical natural resources policy that will impact current AFNR systems (e.g., for water resources, land use, air quality, etc.).
CS.04.02.01.c. Defend or challenge natural resources trends and technologies based upon an assessment of their impact on AFNR systems.
CS.04.02.02.c. Design and implement strategies for implementing a new natural resources policy that will positively impact AFNR systems.
<b>CS.05. Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food &amp; Natural Resources career pathways.</b>
CS.05.01. Evaluate and implement the steps and requirements to pursue a career opportunity in each of the AFNR career pathways (e.g., goals, degrees, certifications, resumes, cover letter, portfolios, interviews, etc.).
CS.05.01.01.a. Identify and summarize the steps to pursue a career in an AFNR pathway (e.g., self-assessment, set goals, etc.).
CS.05.01.02.a. Examine the educational, training and experiential requirements to pursue a career in an AFNR pathway (e.g., degrees, certifications, training, internships, etc.).
CS.05.01.03.a. Research and summarize specific tools (e.g., resumes, portfolios, cover letters, etc.) and processes (e.g., interviews, applications, etc.) needed to pursue a career in an AFNR pathway.
CS.05.01.01.b. Create a personal plan outlining goals and steps to obtain a career in an AFNR pathway.
CS.05.01.02.b. Analyze personal skillset and create a plan for obtaining the required education, training and experiences to obtain a career in an AFNR pathway.
CS.05.01.03.b. Assess personal goals, experiences, education and skillsets and organize them to produce the appropriate tools and develop the skills to effectively communicate about one’s qualifications for an AFNR career.
CS.05.01.01.c. Evaluate progress toward AFNR career goals and identify opportunities for improvement and necessary adjustments to one’s plan of action.

<b>Agriculture, Food and Natural Resources Cluster Skills</b>
CS.05.01.02.c. Implement one’s personal plan of action for obtaining the required education, training and experiences and evaluate progress to identify opportunities for improvement and necessary adjustments.
CS.05.01.03.c. Evaluate, update and improve a set of personal tools to reflect current skills, experiences, education, goals, etc. and complete the processes needed to pursue and obtain a career in an AFNR pathway.
CS.05.02. Examine and choose career opportunities that are matched to personal skills, talents, and career goals in an AFNR pathway of interest.
CS.05.02.01.a. Examine and categorize careers in each of the AFNR pathways.
CS.05.02.02.a. Research and describe careers in each of the AFNR pathways and choose potential careers connecting to personal interests and skills.
CS.05.02.01.b. Assess personal skills and align them with potential career opportunities in AFNR pathways.
CS.05.02.02.b. Assemble and analyze examples of careers and related statistics on a local, state, national and global level.
CS.05.02.01.c. Interpret and evaluate the results of a personal career assessment and connect them to potential careers in AFNR pathways.
CS.05.02.02.c. Conduct interviews with career professionals within AFNR pathways and summarize the results.
<b>CS.06. Analyze the interaction among AFNR systems in the production, processing and management of food, fiber and fuel and the sustainable use of natural resources.</b>
CS.06.01. Examine and explain foundational cycles and systems of AFNR.
CS.06.01.01.a. Research and explain the foundational cycles in AFNR (e.g., water cycle, nutrient cycle, carbon cycle, etc.).
CS.06.01.02.a. Examine and describe examples of systems within AFNR (e.g., sustainability, gate-to-plate, etc.).
CS.06.01.01.b. Analyze and explain how foundational cycles affect production, processing and management of food, fiber and fuel.
CS.06.01.02.b. Analyze AFNR systems and determine their impact on producing and processing food, fiber and fuel.
CS.06.01.01.c. Teach others about the impact of foundational cycles within AFNR systems.
CS.06.01.02.c. Evaluate AFNR systems and predict how the systems may change or adapt in the future of food, fiber and fuel production based on current trends and data.
CS.06.02. Analyze and explain the connection and relationships between different AFNR systems on a national and global level.
CS.06.02.01.a. Summarize how AFNR systems connect and relate on a national and global level (e.g., soil, water, economic, etc.).
CS.06.02.02.a. Examine and summarize changes that happen in AFNR systems on a national and global level (e.g., using less irrigation water, reduction of inputs, etc.).

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CS.06.02.01.b. Analyze differences between AFNR systems on a national and global scale.
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CS.06.02.02.b. Analyze the connections and relationships impacted when there is a change in an AFNR system on a national and global level.
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CS.06.02.01.c. Evaluate how AFNR systems impact each other on a national and global level.
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CS.06.02.02.c. Evaluate how changes in one AFNR system can benefit cost components of other systems on a national and global level.
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<b>Agribusiness Systems Career Pathway</b>
<b>ABS.01. Apply management planning principles in AFNR businesses.</b>
ABS.01.01. Apply micro- and macroeconomic principles to plan and manage inputs and outputs in an AFNR business.
ABS.01.01.01.a. Examine and provide examples of microeconomic principles related to decisions about AFNR business inputs and outputs (e.g., supply, demand and equilibrium, elasticity, diminishing returns, opportunity cost, etc.).
ABS.01.01.02.a. Examine and provide examples of macroeconomic principles related to AFNR businesses (e.g., Gross Domestic Product, inflation, capital accounts, unemployment rate, etc.).
ABS.01.01.03.a. Define and research the nature of monetary policies in different global economic systems (e.g., traditional economic system, command economic system, market economic system, mixed economic system, etc.).
ABS.01.01.01.b. Apply microeconomic principles to calculate values associated with different inputs and outputs in AFNR businesses (e.g., price, point of equilibrium, opportunity costs, marginal costs, etc.).
ABS.01.01.02.b. Analyze and describe the relationship between AFNR business and industry outputs and domestic and global macroeconomic trends (e.g., Gross Domestic Product, national income, rate of growth, price levels, etc.).
ABS.01.01.03.b. Assess the monetary policy in different countries and explain how it impacts AFNR businesses.
ABS.01.01.01.c. Create strategies to maximize the efficiency of AFNR business inputs and outputs using microeconomic principles.
ABS.01.01.02.c. Analyze the impact of the current macroeconomic environment on decisions related to AFNR businesses.
ABS.01.01.03.c. Create recommendations for change in monetary policy according to a scenario related to an AFNR business.
ABS.01.02. Read, interpret, evaluate and write statements of purpose to guide business goals, objectives and resource allocation.
ABS.01.02.01.a. Read and interpret statements of purpose (e.g., vision, mission statement, charter, etc.).
ABS.01.02.02.a. Identify the meaning and importance of goals and objectives in AFNR business enterprises.
ABS.01.02.01.b. Assess different approaches for creating statements of purpose for AFNR businesses and choose an appropriate approach to meet organizational needs.
ABS.01.02.02.b. Prepare short-term, intermediate and long-term goals and objectives that are consistent with the statements of purpose for an AFNR business.
ABS.01.02.01.c. Create and disseminate statements of purpose for activities in AFNR businesses.

<b>Agribusiness Systems Career Pathway</b>
ABS.01.02.02.c. Evaluate AFNR business goals and objectives, then make revisions based on data and observations.
ABS.01.03. Devise and apply management skills to organize and run an AFNR business in an efficient, legal and ethical manner.
ABS.01.03.01.a. Define and provide examples of management skills used to organize an AFNR business (e.g., management types, organizational structures, time management techniques, conducting business agreements, etc.).
ABS.01.03.02.a. Identify and interpret appropriate local, state, federal, international and industry regulations that impact the management and operation of AFNR businesses.
ABS.01.03.03.a. Identify and evaluate the presence or lack of ethical standards in planning and operating AFNR businesses.
ABS.01.03.01.b. Analyze the effectiveness of different management skills used in an AFNR business.
ABS.01.03.02.b. Assess and describe the positive and negative impact of local, state, federal, international and industry regulations on the management and operation of AFNR businesses.
ABS.01.03.03.b. Analyze the importance of using ethical standards and develop methods to communicate ethical standards within AFNR businesses.
ABS.01.03.01.c. Devise strategies to improve the operation of AFNR businesses using management skills.
ABS.01.03.02.c. Devise management or operational strategies to address and adhere to local, state, federal, international and industry regulations.
ABS.01.03.03.c. Design methods for AFNR businesses to implement ethical standards in management skills (e.g., management types, organizational structures, time management techniques, conducting business agreements, etc.).
ABS.01.04. Evaluate, develop and implement procedures used to recruit, train and retain productive human resources for AFNR businesses.
ABS.01.04.01.a. Research and explain the meaning and functions of human resources in AFNR businesses (e.g., recruitment, evaluate employee performance, employee record management, compensation, etc.).
ABS.01.04.02.a. Identify and explain programs used in AFNR businesses to recruit, train and retain employees and define their purpose (e.g., career development, training plans, recruitment plans, evaluation programs, etc.).
ABS.01.04.03.a. Research and summarize purposes and objectives of benefit and compensation plans for AFNR businesses.
ABS.01.04.01.b. Create methods to describe specific positions and structures of an AFNR business to share with human resources (e.g., job descriptions, business information sheet, pamphlet, etc.).

<b>Agribusiness Systems Career Pathway</b>
ABS.01.04.02.b. Analyze and evaluate pro-grams used to recruit, train and retain employees based on their effectiveness.
ABS.01.04.03.b. Generate compliant and competitive benefit and compensation plans for AFNR business employees.
ABS.01.04.01.c. Establish and maintain appropriate records and reports on human resources in AFNR businesses (e.g., personal records, absenteeism record, payroll data, employee requests, etc.).
ABS.01.04.02.c. Design guidelines and programs to recruit, train and retain employees in AFNR businesses.
ABS.01.04.03.c. Create recommendations for AFNR employers to improve current benefit and compensation plans (e.g., how to motivate employees, recognize productivity, equitably compensate, etc.).
<b>ABS.02. Use record keeping to accomplish AFNR business objectives, manage budgets and comply with laws and regulations.</b>
ABS.02.01. Apply fundamental accounting principles, systems, tools and applicable laws and regulations to record, track and audit AFNR business transactions (e.g., accounts, debits, credits, assets, liabilities, equity, etc.).
ABS.02.01.01.a. Examine and describe accounting systems and procedures used for record keeping in AFNR businesses (e.g., cash vs. accrual systems, identification of appropriate accounts, double-entry accounting, entry of debits and credits, etc.).
ABS.02.01.02.a. Research and summarize the features of different tools and services for recording, tracking and auditing AFNR business transactions (e.g., electronic tools, paper-based tools, consultative services, online services, banking services, etc.).
ABS.02.01.03.a. Research and examine the implications of applicable laws and regulations related to recording, tracking and auditing AFNR business transactions (e.g., Generally Accepted Accounting Principles, data security, etc.).
ABS.02.01.01.b. Evaluate the implementation and appropriateness of accounting systems and procedures used for record keeping in AFNR businesses.
ABS.02.01.02.b. Compare and contrast the benefits and limitations of different tools and services for recording, tracking, and auditing AFNR business transactions (e.g., convenience, costs, data security, etc.).
ABS.02.01.03.b. Predict and calculate the consequences of non-compliance with laws and regulations related to recording, tracking and auditing accounting information in AFNR businesses.
ABS.02.01.01.c. Select appropriate accounting systems and develop accounting procedures to maintain records for AFNR businesses.
ABS.02.01.02.c. Recommend and select tools and services to track, record and audit AFNR business transactions that meet business needs and priorities (e.g., electronic and paper based systems, etc.).

<b>Agribusiness Systems Career Pathway</b>
ABS.02.01.03.c. Assess the degree to which AFNR accounting practices comply with laws and regulations related to recording, tracking and auditing accounting information in AFNR businesses.
ABS.02.02. Assemble, interpret and analyze financial information and reports to monitor AFNR business performance and support decision-making (e.g., income statements, balance sheets, cash-flow analysis, inventory reports, break-even analysis, return on investment, taxes, etc.).
ABS.02.02.01.a. Compare and contrast the different types of financial reports (e.g., income statements, cash flow statements, equity statements, etc.) and their frequency of use (e.g., daily, weekly, monthly, quarterly, annual) for monitoring AFNR business performance.
ABS.02.02.02.a. Research and summarize strategies for tracking, reporting and managing inventory in AFNR businesses (e.g., spreadsheets, databases, word processing, networked systems and the Internet, etc.).
ABS.02.02.03.a. Define and classify different types of taxes that may be paid by AFNR businesses (e.g., income, property, sales, employment, estate, etc.).
ABS.02.02.01.b. Prepare and interpret financial reports to describe the performance of AFNR businesses (e.g., efficiency, profitability, net worth, financial ratios, working capital ratio, leverage, etc.).
ABS.02.02.02.b. Use accounting information to prepare financial reports associated with inventory in AFNR businesses (e.g., cost of goods sold, margins on goods, etc.).
ABS.02.02.03.b. Analyze and describe reporting requirements for different types of taxes paid by AFNR businesses (e.g., income, property, sales, employment, etc.).
ABS.02.02.01.c. Recommend appropriate financial reports to assemble to support specific AFNR business decisions (e.g., evaluating efficiency, profitability, net worth, financial ratios, etc.).
ABS.02.02.02.c. Create recommendations to improve management of inventory in AFNR businesses (e.g., maintaining optimal levels, calculating costs of carrying input and output inventory, supply chain management, etc.).
ABS.02.02.03.c. Assemble financial information to prepare tax filings for AFNR businesses.
<b>ABS.03. Manage cash budgets, credit budgets and credit for an AFNR business using generally accepted accounting principles.</b>
ABS.03.01. Develop, assess and manage cash budgets to achieve AFNR business goals.
ABS.03.01.01.a. Compare and contrast components of cash budgets (e.g., anticipated revenue, production costs, overhead costs, profit, etc.) and identify the appropriate components to include in a budget given the nature of the AFNR enterprise.
ABS.03.02.02.a. Examine and interpret the terms and conditions associated with credit instruments used in AFNR businesses (e.g., repayment terms, APR, grace periods, personal liability, interest rates, etc.).

<b>Agribusiness Systems Career Pathway</b>
ABS.03.02.01.b. Analyze AFNR business needs to determine the necessity of loans for business operation.
ABS.03.02.02.b. Compare and contrast strategies to responsibly manage credit budgets in AFNR businesses.
ABS.03.02.01.c. Analyze and assemble the information needed to obtain credit for AFNR businesses.
ABS.03.02.02.c. Analyze AFNR business needs and recommend appropriate uses of available credit budgets to meet goals.
<b>ABS.04. Develop a business plan for an AFNR business.</b>
ABS.04.01. Analyze characteristics and planning requirements associated with developing business plans for different types of AFNR businesses.
ABS.04.01.01.a. Describe the meaning, importance and economic impact of entrepreneurship on the AFNR industry and larger economy.
ABS.04.01.02.a. Categorize the characteristics of the types of ownership structures used in AFNR businesses (e.g., sole proprietorships, cooperatives, partnerships and corporations).
ABS.04.01.03.a. Research and describe the components to include in a business plan for an AFNR business.
ABS.04.01.01.b. Classify the characteristics of successful entrepreneurs in AFNR businesses.
ABS.04.01.02.b. Compare and contrast business plans for different types of ownership structures used in AFNR businesses.
ABS.04.01.03.b. Analyze the information needed and strategies to obtain the information to complete an AFNR business plan (e.g., SMART goals and objectives, needs assessment, cash flow projection, etc.).
ABS.04.01.01.c. Demonstrate the application of entrepreneurial skills to conceptualize an AFNR business (e.g., idea generation, opportunity analysis, risk assessment, etc.).
ABS.04.01.02.c. Generate conclusions about the successes and failures of AFNR businesses within the global economics system as related to the business ownership structure.
ABS.04.01.03.c. Prepare a business plan for an AFNR business.
<b>ABS.04.02. Develop production and operational plans for an AFNR business.</b>
ABS.04.02.01.a. Identify and define the components of operational plans in AFNR businesses (e.g., location, supply and inventory management, production and distribution, organization structure, etc.).
ABS.04.02.02.a. Devise strategies to illustrate the production process of an AFNR business to produce a specific agricultural product.
ABS.04.02.01.b. Compare and contrast the strengths and weaknesses of operational plans from different AFNR businesses to determine best practices.
ABS.04.02.02.b. Identify and assess alternative production systems for a specific agricultural product.

<b>Agribusiness Systems Career Pathway</b>
ABS.04.02.01.c. Make recommendations to improve operational plans for an AFNR business based on best practices.
ABS.04.02.02.c. Create strategies to improve the production process of an agricultural product for an AFNR facility (e.g., SWOT- strengths, weaknesses, opportunities and threats, supply chain management, etc.).
<b>ABS.04.03. Identify and apply strategies to manage or mitigate risk.</b>
ABS.04.03.01.a. Assess and classify sources of risk for an AFNR business (e.g., financial risk, public perception of company, etc.).
ABS.04.03.02.a. Research and summarize examples that illustrate the importance of risk and uncertainty within AFNR businesses.
ABS.04.03.01.b. Risk management strategies for AFNR businesses (e.g., cash flow projection, analyze market trends, etc.).
ABS.04.03.02.b. Analyze alternative approaches to reducing risk for AFNR businesses (e.g., insurance for product liability, property, production or income loss for personnel life and health, etc.).
ABS.04.03.01.c. Determine methods to match risk management strategies to risk situations in an AFNR business.
ABS.04.03.02.c. Prepare a comprehensive risk management and contingency plan for an AFNR business.
<b>ABS.05. Use sales and marketing principles to accomplish AFNR business objectives.</b>
ABS.05.01. Analyze the role of markets, trade, competition and price in relation to an AFNR business sales and marketing plans.
ABS.05.01.01.a. Distinguish and explain markets related to AFNR businesses (e.g. commodity markets, energy markets, etc.).
ABS.05.01.02.a. Research and summarize different forms of market competition found in AFNR businesses (e.g., direct competitors, indirect competitors, replacement competitors, etc.).
ABS.05.01.01.b. Analyze and describe the role of trade and price in the market structure as it relates to AFNR businesses.
ABS.05.01.02.b. Compare and contrast different forms of market competition and how they can be applied to different AFNR businesses.
ABS.05.01.01.c. Evaluate and predict future trends for a specific AFNR product as related to markets, trade and price (e.g., corn, oil, wheat, etc.).
ABS.05.01.02.c. Design and conduct experiments to determine market competition effectiveness of different AFNR businesses.
<b>ABS.05.02. Assess and apply sales principles and skills to accomplish AFNR business objectives.</b>
ABS.05.02.01.a. Identify and explain components of the sales process for AFNR businesses (e.g., understanding needs, develop solutions, close sale, etc.).

<b>Agribusiness Systems Career Pathway</b>
ABS.05.02.02.a. Research and summarize examples of different types of sales calls used in AFNR businesses (e.g., cold calls, face-to-face meetings, follow up calls, etc.).
ABS.05.02.01.b. Apply the sales process to AFNR businesses and communicate ways of accomplishing the businesses' goals and objectives.
ABS.05.02.02.b. Assess different customer reactions that could be encountered during different types of sales calls used in AFNR businesses and prepare an appropriate response (e.g., objections, competitor prices, competing products, post-sale service, complaints about product, etc.).
ABS.05.02.01.c. Analyze the sales process of AFNR businesses and create methods to suggest improvements.
ABS.05.02.02.c. Create strategies for developing plans for different types of sales calls used in AFNR businesses.
<b>ABS.05.03. Assess marketing principles and develop marketing plans to accomplish AFNR business objectives.</b>
ABS.05.03.01.a. Identify and explain marketing principles used in AFNR businesses (e.g., 4 P's-product, place, price, promotion; attention, interest, desire, action, etc.).
ABS.05.03.02.a. Research and categorize different strategies used in marketing programs for AFNR businesses (e.g., Internet, direct to customer, social media, etc.).
ABS.05.03.03.a. Research and summarize the purpose, components and process to develop marketing plans for AFNR businesses.
ABS.05.03.01.b. Assess and select appropriate alternative marketing strategies (e.g. value-adding, branding, niche marketing, etc.) for AFNR businesses using established marketing principles.
ABS.05.03.02.b. Compare and contrast the strategies of marketing for products and services used in AFNR businesses (e.g., direct marketing, commodities, etc.).
ABS.05.03.03.b. Perform a market analysis to gather information for marketing plans for AFNR businesses (e.g., evaluation of competitors, customers, domestic and international policy, regulations and rules, standards, etc.).
ABS.05.03.01.c. Deconstruct and analyze current AFNR marketing plans to determine the effectiveness of implementation of marketing principles and alternative marketing strategies.
ABS.05.03.02.c. Devise plans to implement and evaluate marketing strategies for products and services used in AFNR businesses.
ABS.05.03.03.c. Construct comprehensive marketing plans for AFNR businesses.

<b>Animal Systems Career Pathway</b>
<b>AS.01. Analyze historic and current trends impacting the animal systems industry.</b>
AS.01.01. Evaluate the development and implications of animal origin, domestication and distribution on production practices and the environment.
AS.01.01.01.a. Identify and summarize the origin, significance, distribution and domestication of different animal species.
AS.01.01.02.a. Research and summarize major components of animal systems (e.g., livestock, companion animal, etc.).
AS.01.01.01.b. Evaluate and describe characteristics of animals that developed in response to the animal’s environment and led to their domestication.
AS.01.01.02.b. Describe the historical and scientific developments of different animal industries and summarize the products, services and careers associated with each.
AS.01.01.01.c. Evaluate the implications of animal adaptations on production practices and the environment.
AS.01.01.02.c. Predict trends and implications of future developments within different animal industries on production practices and the environment.
<b>AS.01.02. Assess and select animal production methods for use in animal systems based upon their effectiveness and impacts.</b>
AS.01.02.01.a. Identify and categorize terms and methods related to animal production (e.g., sustainable, conventional, humanely raised, natural, organic, etc.).
AS.01.02.02.a. Research and examine marketing methods for animal products and services (e.g., conventional, niche markets, locally grown, etc.).
AS.01.02.03.a. Summarize the types, purposes, and characteristics of effective record keeping and documentation practices for animal systems enterprises (e.g., managing records for animal identification, feeding, breeding, treatment, income/expense, etc.).
AS.01.02.04.a. Identify and summarize wildlife management methods.
AS.01.02.01.b. Analyze the impact of animal production methods on end product qualities (e.g., price, sustainability, marketing, labeling, animal welfare, etc.).
AS.01.02.02.b. Calculate costs of marketing versus predicted increases in sales.
AS.01.02.03.b. Analyze and evaluate the accuracy and effectiveness of records used in an animal system business.
AS.01.02.04.b. Research and summarize local wildlife populations, challenges and ecological measures that are being utilized.
AS.01.02.01.c. Evaluate the effectiveness of different production methods and defend the use of selected methods using data and evidence.
AS.01.02.02.c. Devise and evaluate marketing plans for an animal agriculture product or service.
AS.01.02.03.c. Select and defend the use of a specific record management system based upon its effectiveness for a business related to animal systems.

<b>Animal Systems Career Pathway</b>
AS.01.02.04.c. Devise and evaluate plans to manage wildlife populations to achieve optimal ecological health.
AS.01.03. Analyze and apply laws and sustainable practices to animal agriculture from a global perspective.
AS.01.03.01.a. Distinguish between the types of laws pertaining to animal systems.
AS.01.03.02.a. Research and summarize sustainability in animal systems.
AS.01.03.01.b. Analyze the structure of laws governing animal industries, international trade and animal production policies.
AS.01.03.02.b. Analyze the local and global impact of sustainable animal agriculture practices on human and environmental systems.
AS.01.03.01.c. Evaluate the impact of laws pertaining to animal agriculture (e.g., pros, cons, effect on individuals, effect on businesses, etc.) and assess the compliance of production practices with established regulations.
AS.01.03.02.c. Select, evaluate and defend the use of sustainable practices in animal agriculture.
<b>AS.02. Utilize best-practice protocols based upon animal behaviors for animal husbandry and welfare.</b>
AS.02.01. Demonstrate management techniques that ensure animal welfare.
AS.02.01.01.a. Explain the implications of animal welfare and animal rights for animal systems.
AS.02.01.02.a. Research and summarize the challenges involved in working with animals and resources available to overcome them (e.g., tools, technology, equipment, facilities, animal behavior signals, etc.).
AS.02.01.03.a. Distinguish between animal husbandry practices that promote animal welfare and those that do not.
AS.02.01.01.b. Design programs that assure the welfare of animals and prevent abuse or mistreatment.
AS.02.01.02.b. Analyze and document animal welfare procedures used to ensure safety and maintain low stress when moving and restraining animals.
AS.02.01.03.b. Analyze and document animal husbandry practices and their impact on animal welfare.
AS.02.01.01.c. Implement and evaluate quality-assurance programs and procedures for animal production.
AS.02.01.02.c. Devise, implement and evaluate safety procedures and plans for working with animals by species using information based on animal behavior and responses.
AS.02.01.03.c. Devise economical recommendations to increase the welfare of animals in animal systems.
AS.02.02. Analyze procedures to ensure that animal products are safe for consumption (e.g., use in food system, etc.).

<b>Animal Systems Career Pathway</b>
AS.02.02.01.a. Identify and categorize tools, technology and equipment used in animal husbandry and welfare to help provide an abundant and safe food supply.
AS.02.02.02.a. Research and summarize animal production practices that may pose health risks.
AS.02.02.03.a. Identify and describe animal tracking systems used in animal systems (e.g., livestock, companion animal, exotics, etc.).
AS.02.02.01.b. Utilize tools, technology and equipment to perform animal husbandry and welfare tasks.
AS.02.02.02.b. Analyze consumer concerns with animal production practices relative to human health.
AS.02.02.03.b. Analyze and summarize the impact of animal trace-back capabilities on producers and consumers.
AS.02.02.01.c. Select, evaluate and defend the use of specific tools, technology or equipment used to perform animal husbandry and welfare tasks.
AS.02.02.02.c. Research and evaluate programs to assure the safety of animal products for consumption.
AS.02.02.03.c. Evaluate the effectiveness of animal and/or premise identification programs for a given species.
<b>AS.03. Design and provide proper animal nutrition to achieve desired outcomes for performance, development, reproduction and/or economic production.</b>
<b>AS.03.01. Analyze the nutritional needs of animals.</b>
AS.03.01.01.a. Identify and summarize essential nutrients required for animal health and analyze each nutrient's role in growth and performance.
AS.03.01.02.a. Differentiate between nutritional needs of animal species.
AS.03.01.01.b. Differentiate between nutritional needs of animals in different growth stages and production systems (e.g., maintenance, gestation, natural, organic, etc.).
AS.03.01.02.b. Correlate a species' nutritional needs to feedstuffs that could meet those needs.
AS.03.01.01.c. Assess nutritional needs for an individual animal based on its growth stage and production system.
AS.03.01.02.b. Design and defend the use of a nutritional program by demonstrating the relationship between the nutrient requirements and the feedstuffs provided.
<b>AS.03.02 Analyze feed rations and assess if they meet the nutritional needs of animals.</b>
AS.03.02.01.a. Compare and contrast common types of feedstuffs and the roles they play in the diets of animals.
AS.03.02.02.a. Examine the importance of a balanced ration for animals based on the animal's growth stage (e.g., maintenance, newborn, gestation, lactation, etc.).
AS.03.02.03.a. Examine the purpose, impact and mode of action of feed additives and growth promotants in animal production.

<b>Animal Systems Career Pathway</b>
AS.03.02.01.b. Determine the relative nutritional value of feedstuffs by evaluating their general quality and condition.
AS.03.02.02.b. Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements and performance.
AS.03.02.03.b. Compare and contrast methods that utilize feed additives and growth promotants with production practices that do not, (e.g., organic versus conventional production methods).
AS.03.02.01.c. Select appropriate feedstuffs for animals based on a variety of factors (e.g., economics, digestive system and nutritional needs, etc.).
AS.03.02.02.c. Select and utilize animal feeds based on nutritional requirements, using rations for maximum nutrition and optimal economic production.
AS.03.02.03.c. Make and defend decisions regarding whether to use feed additives and growth promotants after researching and considering scientific evidence, production system needs and goals, and input from industry professionals.
<b>AS.03.03 Utilize industry tools to make animal nutrition decisions.</b>
AS.03.03.01.a. Identify and categorize tools and equipment used to meet animal nutrition needs and ensure an abundant and safe food supply.
AS.03.03.02.a. Examine and summarize the meaning of various components of feed labels and feeding directions.
AS.03.03.03.a. Examine the use of technology to provide animal nutrition.
AS.03.03.01.b. Utilize tools and equipment to perform animal nutrition tasks.
AS.03.03.02.b. Analyze and apply information from a feed label and feeding directions to feed animals.
AS.03.03.03.b. Analyze technologies used to provide animal nutrition and summarize their potential benefits and consequences.
AS.03.03.01.c. Select, evaluate and defend the use of specific tools or equipment used to perform animal nutrition tasks.
AS.03.03.02.c. Evaluate and summarize the potential impacts, positive and negative, of compliance and/or noncompliance with a feed label and feeding directions.
AS.03.03.03.c. Research and recommend technology improvements to provide proper nutrition to animals.
<b>AS.04. Apply principles of animal reproduction to achieve desired outcomes for performance, development and/or economic production.</b>
<b>AS.04.01. Evaluate animals for breeding readiness and soundness.</b>
AS.04.01.01.a. Identify and categorize the male and female reproductive organs of the major animal species.
AS.04.01.02.a. Compare and contrast how age, size, life cycle, maturity level and health status affect the reproductive efficiency of male and female animals.

<b>Animal Systems Career Pathway</b>
AS.04.02.03.a. Summarize the importance of efficient and economic reproduction in animals.
AS.04.01.01.b. Analyze the functions of major organs in the male and female reproductive systems.
AS.04.01.02.b. Assess and describe factors that lead to reproductive maturity.
AS.04.02.03.b. Evaluate reproductive problems that occur in animals.
AS.04.01.01.c. Select breeding animals based on characteristics of the reproductive organs.
AS.04.01.02.c. Evaluate and select animals for reproductive readiness.
AS.04.02.03.c. Treat or cull animals with reproductive problems.
<b>AS.04.02. Apply scientific principles to select and care for breeding animals.</b>
AS.04.02.01.a. Summarize genetic inheritance in animals.
AS.04.02.02.a. Identify and summarize inheritance and terms related to inheritance in animal breeding (e.g., dominate, co-dominate, recessive, homozygous, heterozygous, etc.).
AS.04.02.03.a. Identify and summarize genetic defects that affect animal performance.
AS.04.02.04.a. Identify and summarize different needs of breeding animals based on their growth stages (e.g., newborn, parturition, gestation, gestation lengths, etc.).
AS.04.02.01.b. Compare and contrast the use of genetically superior animals in the production of animals and animal products.
AS.04.02.02.b. Demonstrate how to determine probability trait inheritance in animals.
AS.04.02.03.b. Analyze how DNA analysis can detect genetic defects in breeding stock.
AS.04.02.04.b. Analyze the care needs for breeding stock in each stage of growth.
AS.04.02.01.c. Select and evaluate a breeding system based on the principles of genetics.
AS.04.02.02.c. Select and evaluate breeding animals and determine the probability of a given trait in their offspring.
AS.04.02.03.c. Perform a DNA analysis and use the data to make and defend breeding decisions.
AS.04.02.04.c. Create a plan to differentiate care of a species of breeding animals throughout their growth stages.
<b>AS.04.03 Apply scientific principles to breed animals.</b>
AS.04.03.01.a. Identify and categorize natural and artificial breeding methods (e.g., natural breeding, artificial insemination, estrous synchronization, flushing, cloning, etc.).
AS.04.03.02.a. Analyze the materials, methods and processes of artificial insemination.
AS.04.03.03.a. Identify and summarize the advantages and disadvantages of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer (e.g., cost, labor, equipment, etc.).
AS.04.03.04.a. Examine the use of quantitative breeding values (e.g., EPDs, Performance records, pedigrees) in the selection of genetically superior breeding stock.
AS.04.03.01.b. Calculate the potential economic benefits of natural versus artificial breeding methods.

<b>Animal Systems Career Pathway</b>
AS.04.03.02.b. Demonstrate artificial insemination techniques.
AS.04.03.03.b. Analyze the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer.
AS.04.03.04.b. Compare and contrast quantitative breeding value differences between genetically superior animals and animals of average genetic value.
AS.04.03.01.c. Select animal breeding methods based on reproductive and economic efficiency.
AS.04.03.02.c. Evaluate the implementation and effectiveness of artificial insemination techniques.
AS.04.03.03.c. Create and evaluate plans and procedures for estrous synchronization, superovulation, flushing, embryo transfer and other reproductive management practices.
AS.04.03.04.c. Select and assess animal performance based on quantitative breeding values for specific characteristics.
<b>AS.05. Evaluate environmental factors affecting animal performance and implement procedures for enhancing performance and animal health.</b>
AS.05.01. Design animal housing, equipment and handling facilities for the major systems of animal production.
AS.05.01.01.a. Differentiate between the types of facilities needed to house and produce animal species safely and efficiently.
AS.05.01.02.a. Identify and summarize equipment, technology and handling facility procedures used in modern animal production (e.g., climate control devices, sensors, automation, etc.).
AS.05.01.01.b. Critique designs for an animal facility and prescribe alternative layouts and adjustments for the safe, sustainable and efficient use of the facility.
AS.05.01.02.b. Analyze the use of modern equipment, technology and handling facility procedures and determine if they enhance the safe, economic and sustainable production of animals.
AS.05.01.01.c. Design an animal facility focusing on animal requirements, economic efficiency, sustainability, safety and ease of handling.
AS.05.01.02.c. Select, use and evaluate equipment, technology and handling procedures to enhance sustainability and production efficiency.
AS.05.02. Comply with government regulations and safety standards for facilities used in animal production.
AS.05.02.01.a. Identify and summarize the general standards that must be met in facilities for animal production (e.g., environmental, zoning, construction, etc.).
AS.05.02.02.a. Distinguish between the types of laws and regulations pertaining to animal systems.
AS.05.02.01.b. Analyze animal facilities to determine if standards have been met.
AS.05.02.02.b. Analyze the structure of laws pertaining to animal systems.

<b>Animal Systems Career Pathway</b>
AS.05.02.01.c. Evaluate facility designs and make recommendations to ensure that it meets standards for the legal, safe, ethical, economical and efficient production of animals.
AS.05.02.02.c. Evaluate the impact of laws pertaining to animal systems.
<b>AS.06. Classify, evaluate and select animals based on anatomical and physiological characteristics.</b>
AS.06.01. Classify animals according to taxonomic classification systems and use (e.g. agricultural, companion, etc.).
AS.06.01.01.a. Explain the importance of the binomial nomenclature system for classifying animals.
AS.06.01.02.a. Compare and contrast major uses of different animal species (e.g., agricultural, companion, etc.).
AS.06.01.03.a. Identify and summarize common classification terms utilized in animal systems (e.g., external and internal body parts, maturity, mature male, immature female, animal products, breeds, etc.).
AS.06.01.01.b. Explain how animals are classified using a taxonomic classification system.
AS.06.01.02.b. Appraise and evaluate the economic value of animals for various applications in the agriculture industry.
AS.06.01.03.b. Analyze the visual characteristics of an animal or animal product and select correct classification terminology when referring to companion and production animals.
AS.06.01.01.c. Assess taxonomic characteristics and classify animals according to the taxonomic classification system.
AS.06.01.02.c. Recommend different uses for an animal species based upon an analysis of local market needs.
AS.06.01.03.c. Apply knowledge of classification terms to communicate with others about animal systems in an effective and accurate manner.
<b>AS.06.02. Apply principles of comparative anatomy and physiology to uses within various animal systems.</b>
AS.06.02.01.a. Research and summarize characteristics of a typical animal cell and identify the organelles.
AS.06.02.02.a. Examine the basic functions of animal cells in animal growth and reproduction.
AS.06.02.03.a. Identify and summarize the properties, locations, functions and types of animal cells, tissues, organs and body systems.
AS.06.02.01.b. Analyze the functions of each animal cell structure.
AS.06.02.02.b. Analyze the processes of meiosis and mitosis in animal growth, development, health and reproduction.
AS.06.02.03.b. Compare and contrast animal cells, tissues, organs, body systems types and functions among animal species.

<b>Animal Systems Career Pathway</b>
AS.06.02.01.c. Correlate the functions of animal cell structures to animal growth, development, health and reproduction.
AS.06.02.02.c. Apply the processes of meiosis and mitosis to solve animal growth, development, health and reproductive problems.
AS.06.02.03.c. Apply knowledge of anatomical and physiological characteristics of animals to make production and management decisions.
<b>AS.06.03. Select and train animals for specific purposes and maximum performance based on anatomy and physiology.</b>
AS.06.03.01.a. Identify and summarize how an animal’s health can be affected by anatomical and physiological disorders.
AS.06.03.02.a. Evaluate an animal against its optimal anatomical and physiological characteristics.
AS.06.03.03.a. Research and summarize the use of products and by-products derived from animals.
AS.06.03.01.b. Compare and contrast desirable anatomical and physiological characteristics of animals within and between species.
AS.06.03.02.b. Compare and contrast procedures to sustainably and efficiently develop an animal to reach its highest performance potential with respect to its anatomical and physiological characteristics.
AS.06.03.03.b. Evaluate and select products from animals based on industry standards.
AS.06.03.01.c. Evaluate and select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth and reproduction.
AS.06.03.02.c. Choose, implement and evaluate sustainable and efficient procedures (e.g., selection, housing, nutrition and management) to produce consistently high-quality animals that are well suited for their intended purposes.
AS.06.03.03.c. Evaluate and select animals to produce superior animal products based on industry standards.
<b>AS.07. Apply principles of effective animal health care.</b>
<b>AS.07.01. Design programs to prevent animal diseases, parasites and other disorders and ensure animal welfare.</b>
AS.07.01.01.a. Identify and summarize specific tools and technology used in animal health management.
AS.07.01.02.a. Explain methods of determining animal health and disorders.
AS.07.01.03.a. List and summarize the characteristics of wounds, common diseases, parasites and physiological disorders that affect animals.
AS.07.01.04.a. Identify and summarize characteristics of causal agents and vectors of diseases and disorders in animals.
AS.07.01.05.a. Explain the clinical significance of common veterinary methods and treatment (e.g., aseptic techniques, antibiotic use, wound management, etc.).

<b>Animal Systems Career Pathway</b>
AS.07.01.01.b. Describe and demonstrate the proper use and function of specific tools and technology related to animal health management.
AS.07.01.02.b. Perform simple health-check evaluations on animals and practice basic emergency response procedures related to animals.
AS.07.01.03.b. Identify and describe common illnesses and disorders of animals based on symptoms and problems caused by wounds, diseases, parasites and physiological disorders.
AS.07.01.04.b. Research and analyze data to evaluate preventive measures for controlling and limiting the spread of diseases, parasites and disorders among animals.
AS.07.01.05.b. Assess the safety and effectiveness of facilities and equipment used for surgical and nonsurgical veterinary treatments and procedures.
AS.07.01.01.c. Select and use tools and technology to meet specific animal health management goals.
AS.07.01.02.c. Determine when an animal health concern needs to be referred to an animal health professional.
AS.07.01.03.c. Treat common diseases, parasites and physiological disorders of animals according to directions prescribed by an animal health professional.
AS.07.01.04.c. Design and implement a health maintenance and a disease and disorder prevention plan for animals in their natural and/or confined environments.
AS.07.01.05.c. Identify and describe surgical and nonsurgical veterinary treatments and procedures to meet specific animal health care objectives.
<b>AS.07.02. Analyze biosecurity measures utilized to protect the welfare of animals on a local, state, national, and global level.</b>
AS.07.02.01.a. Summarize the importance of biosecurity to the animal industry at multiple levels (e.g., local, state, national, global).
AS.07.02.02.a. Identify and describe zoonotic diseases including their historical significance and potential future implications.
AS.07.02.01.b. Analyze procedures at the local, state and national levels to ensure biosecurity of the animal industry.
AS.07.02.02.b. Analyze the health risk of different zoonotic diseases to humans and identify prevention methods.
AS.07.02.01.c. Design and evaluate a biosecurity plan for an animal production operation.
AS.07.02.02.c. Research and evaluate the effectiveness of zoonotic disease prevention methods and procedures to identify those that are best suited to ensure public safety and animal welfare.
<b>AS.08. Analyze environmental factors associated with animal production.</b>
<b>AS.08.01. Design and implement methods to reduce the effects of animal production on the environment.</b>
AS.08.01.01.a. Identify and summarize the effects of animal agriculture on the environment (e.g., waste disposal, carbon footprint, air quality, environmental efficiencies, etc.).

<b>Animal Systems Career Pathway</b>
AS.08.01.01.b. Assess the effectiveness of methods of reducing the effects of animal agriculture on the environment.
AS.08.01.01.c. Devise a plan that includes measures to reduce the impact of animal agriculture on the environment.
AS.08.02. Evaluate the effects of environmental conditions on animals and create plans to ensure favorable environments for animals.
AS.08.02.01.a. Research and summarize environmental conditions that impact animals (e.g., weather, sources of water, food resources, etc.).
AS.08.02.02.a. Identify and summarize methods for ensuring optimal environmental conditions for animals.
AS. 08.02.01.b. Critique the reliability and validity of evidence presented to support claims regarding the effects of environmental conditions on animal populations and performance (e.g., population changes, emerging species, extinction, etc.).
AS.08.02.02.b. Implement and evaluate the effectiveness of methods to ensure optimal environmental conditions for animals.
AS. 08.02.01.c. Apply valid and reliable research evidence to predict the potential effects of different environmental conditions for an animal population.
AS.08.02.02.c. Devise and improve plans to establish favorable environmental conditions for animal growth and performance based on a variety of factors (e.g., economic feasibility, environmental sustainability, impact on animals, etc.).

<b>Biotechnology Systems Career Pathway</b>
<b>BS.01. NCAE Standard: Assess factors that have influenced the evolution of biotechnology in agriculture (e.g., historical events, societal trends, ethical and legal implications, etc.).</b>
BS.01.01. Investigate and explain the relationship between past, current and emerging applications of biotechnology in agriculture (e.g., major innovators, historical developments, potential applications of biotechnology, etc.).
BS.01.01.01.a. Research and summarize the evolution of biotechnology in agriculture.
BS.01.01.02.a. Examine and categorize current applications and gains achieved in applying biotechnology to agriculture.
BS.01.01.03.a. Distinguish between current and emerging applications of biotechnology in agriculture.
BS.01.01.04.a. Compare and contrast the benefits and risks of biotechnology compared with alternative approaches to improving agriculture.
BS.01.01.01.b. Analyze the developmental progression of biotechnology and the evolution of scientific knowledge.
BS.01.01.02.b. Assess and summarize current work in biotechnology being done to add value to agricultural and society.
BS.01.01.03.b. Analyze and document emerging problems and issues associated with agricultural biotechnology.
BS.01.01.04.b. Assess the benefits and risks associated with using biotechnology to improve agriculture.
BS.01.01.01.c. Evaluate and explain how scientists use the scientific method to build upon previous findings in current and emerging research.
BS.01.01.02.c. Evaluate the outcomes and impacts of biotechnology on the globalization of agriculture.
BS.01.01.03.c. Design a potential application of biotechnology to meet emerging agricultural and societal needs.
BS.01.01.04.c. Evaluate the short-term and long-term benefits and risks of applying biotechnology to agriculture.
<b>BS.01.02. Evaluate the scope and implications of regulatory agencies on applications of biotechnology in agriculture and protection of public interests (e.g., health, safety, environmental issues, etc.).</b>
BS.01.02.01.a. Compare and contrast differences between regulatory systems worldwide.
BS.01.02.02.a. Research and document major regulatory issues related to biotechnology in agriculture.
BS.01.02.03.a. Explain the relationship between regulatory agencies and the protection of public interests such as health, safety and the environment.
BS.01.02.01.b. Assess and summarize the role and scope of agencies that regulate biotechnology.

<b>Biotechnology Systems Career Pathway</b>
BS.01.02.02.b. Analyze the impact major regulatory issues have on public acceptance of biotechnology in agriculture.
BS.01.02.03.b. Research and summarize factors and data that regulatory agencies use to evaluate the potential risks a new application of biotechnology may pose to health, safety and the environment.
BS.01.02.01.c. Explain and critique a decision made by a major agency that regulates agricultural biotechnology.
BS.01.02.02.c. Critique and propose a solution for a major regulatory issue pertaining to biotechnology in agriculture.
BS.01.02.03.c. Evaluate data to determine if new technologies present a major regulatory issue to health, safety and/or the environment.
BS.01.03. Analyze the relationship and implications of bioethics, laws and public perceptions on applications of biotechnology in agriculture (e.g., ethical, legal, social, cultural issues).
BS.01.03.01.a. Research and summarize the emergence, evolution and implications of bioethics associated with biotechnology in agriculture.
BS.01.03.02.a. Research and summarize legal issues related to biotechnology in agriculture (e.g., protection of intellectual property through patents, copyright, trademarks, etc.).
BS.01.03.03.a. Research and summarize public perceptions of biotechnology in agriculture (e.g., social and cultural issues).
BS.01.03.01.b. Analyze the implications bioethics may have on future advancements in AFNR.
BS.01.03.02.b. Determine the significance and impacts of legal issues related to biotechnology in agriculture.
BS.01.03.03.b. Analyze the impact of public perceptions on the application of biotechnology in different AFNR systems.
BS.01.03.01.c. Devise and support an argument for or against an ethical issue associated with biotechnology in agriculture.
BS.01.03.02.c. Propose a solution for a legal issue associated with biotechnology in agriculture.
BS.01.03.03.c. Design studies to examine public perceptions of scientifically-based arguments regarding biotechnology in agriculture and reflect on the reasons why the public may support or resist significant breakthroughs using biotechnology.
<b>BS.02. NCAE Standard: Demonstrate proficiency by safely applying appropriate laboratory skills to complete tasks in a biotechnology research and development environment (e.g., standard operating procedures, record keeping, aseptic technique, equipment maintenance, etc.).</b>
BS.02.01. Read, document, evaluate and secure accurate laboratory records of experimental protocols, observations and results.

<b>Biotechnology Systems Career Pathway</b>
BS.02.01.01.a. Compare and contrast common record-keeping methods used in a laboratory (e.g., paper notebook, electronic notebook, etc.).
BS.02.01.02.a. Research and summarize the need for data and information security in a laboratory and demonstrate best practices.
BS.02.01.03.a. Evaluate the role of bioinformatics in agriculture and summarize the types of databases that are available (e.g., genomic, transcriptomics, etc.).
BS.02.01.01.b. Maintain and interpret laboratory records documented in a laboratory to ensure data accuracy and integrity (e.g., avoid bias, record any conflicts of interest, avoid misinterpreted results, etc.).
BS.02.01.02.b. Assess when security procedures for data and information collected in a laboratory should be implemented.
BS.02.01.03.b. Analyze and document the security procedures for data collected using bioinformatics.
BS.02.01.01.c. Evaluate the strengths and weaknesses of using research documentation and propose improvements to ensure study reproduction and utility in future studies.
BS.02.01.02.c. Devise a strategy for ensuring the security of data and information collected in a laboratory.
BS.02.01.03.c. Critique an application of bioinformatics to solve an agricultural issue and recommend procedures for keeping the information safe.
<b>BS.02.02. Implement standard operating procedures for the proper maintenance, use and sterilization of equipment in a laboratory.</b>
BS.02.02.01.a. Identify, interpret, and implement standard operating procedures for laboratory equipment.
BS.02.02.02.a. Categorize and identify laboratory equipment according to its purpose in scientific research.
BS.02.02.03.a. Differentiate between sterilization techniques for equipment in a laboratory (e.g., media bottles vs. laminar flow hood, etc.).
BS.02.02.01.b. Develop a maintenance program for laboratory equipment based upon the standard operating procedures.
BS.02.02.02.b. Manipulate basic laboratory equipment and measurement devices (e.g., water bath, electrophoresis equipment, micropipettes, laminar flow hood, etc.).
BS.02.02.03.b. Create a plan for sterilizing equipment in a laboratory according to standard operating procedures.
BS.02.02.01.c. Perform ongoing maintenance of laboratory equipment according to the standard operating procedures (e.g., calibration, testing, etc.).
BS.02.02.02.c. Operate advanced laboratory equipment and measurement devices (e.g., thermal cycler, imaging system, etc.).
BS.02.02.03.c. Perform sterilization techniques for equipment in a laboratory using standard operating procedures.

<b>Biotechnology Systems Career Pathway</b>
BS.02.03. Apply standard operating procedures for the safe handling of biological and chemical materials in a laboratory.
BS.02.03.01.a. Classify and document basic aseptic techniques in the laboratory.
BS.02.03.02.a. Examine and implement standard operating procedures for the use of biological materials according to directions and their classification (e.g., proper handling of bacteria or DNA before, during and after use).
BS.02.03.03.a. Categorize and label the types of solutions that are commonly prepared in a laboratory (e.g., buffers, reagents, media, etc.).
BS.02.03.01.b. Demonstrate advanced aseptic techniques in the laboratory (e.g., sterile work area, sterile handling, personal hygiene, etc.).
BS.02.03.02.b. Analyze and select an appropriate standard operating procedure for working with biological materials based upon their classification.
BS.02.03.03.b. Formulate and prepare solutions using standard operating procedures (e.g., proper labeling, storage, etc.).
BS.02.03.01.c. Conduct assays and experiments under aseptic conditions.
BS.02.03.02.c. Create a standard operating procedure for a biological process.
BS.02.03.03.c. Verify the physical properties of solutions (e.g., molarity, percent mass/volume, dilutions, etc.).
BS.02.04. Safely manage and dispose of biological materials, chemicals and wastes according to standard operating procedures.
BS.02.04.01.a. Classify different types of personal protective equipment and demonstrate how to properly utilize the equipment.
BS.02.04.02.a. Classify and describe hazards associated with biological and chemical materials.
BS.02.04.03.a. Summarize what happens to waste after it leaves the laboratory and identify opportunities to reduce waste and unnecessary costs.
BS.02.04.01.b. Assess the need for personal protective equipment in a variety of situations and select the appropriate equipment to wear when working with biological and chemical materials.
BS.02.04.02.b. Inventory biological and chemical materials and maintain accurate records of supplies and expiration dates.
BS.02.04.03.b. Perform waste disposal according to the standard operating procedures.
BS.02.04.01.c. Evaluate the benefits and limitations of personal protective equipment.
BS.02.04.02.c. Create a plan for stocking and maintaining supplies of biological and chemical materials in a laboratory.
BS.02.04.03.c. Propose a management plan to reduce laboratory waste and prevent ecological or health problems related to waste disposal.
BS.02.05. Examine and perform scientific procedures using microbes, DNA, RNA and proteins in a laboratory.

<b>Biotechnology Systems Career Pathway</b>
BS.02.05.01.a. Differentiate types of organisms and demonstrate safe handling to maintain organism purity and personal safety (e.g., plant and animal tissue, cell cultures, microbes, etc.).
BS.02.05.02.a. Compare and contrast the structures of DNA and RNA and investigate how genotype influences phenotype.
BS.02.05.03.a. Extract and purify DNA and RNA according to standard operating procedures.
BS.02.05.04.a. Examine and document the role and applications of proteins in agricultural biotechnology.
BS.02.05.05.a. Synthesize the relationship between proteins, enzymes and antibodies.
BS.02.05.01.b. Characterize the physical and biological properties of organisms.
BS.02.05.02.b. Analyze and interpret the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.
BS.02.05.03.b. Perform electrophoretic techniques and interpret electrophoresis fragmentation patterns (e.g., gel electrophoresis, southern blotting, etc.).
BS.02.05.04.b. Demonstrate protein separation techniques and interpret the results.
BS.02.05.05.b. Analyze and document how antibodies are formed and describe how they can be used in agricultural biotechnology.
BS.02.05.01.c. Isolate, maintain, quantify and store cell cultures according to standard operating procedures.
BS.02.05.02.c. Evaluate factors that influence gene expression.
BS.02.05.03.c. Manipulate and analyze DNA and RNA through advanced scientific procedures (e.g., southern blotting, cloning, PCR, RT-PCR, etc.).
BS.02.05.04.c. Evaluate the biochemical properties of proteins to explain their function and predict potential uses.
BS.02.05.05.c. Use antibodies to detect and quantify antigens by conducting an Enzyme-Linked Immunosorbent Assay (ELISA).
<b>BS.03. NCAE Standard: Demonstrate the application of biotechnology to solve problems in Agriculture, Food and Natural Resources (AFNR) systems (e.g., bioengineering, food processing, waste management, horticulture, forestry, livestock, crops, etc.).</b>
BS.03.01. Apply biotechnology principles, techniques and processes to create transgenic species through genetic engineering.
BS.03.01.01.a. Summarize biological, social, agronomic and economic reasons for genetic modification of eukaryotes.
BS.03.01.02.a. Summarize the process of transformation of eukaryotic cells with transgenic DNA.
BS.03.01.03.a. Analyze the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of living species (e.g., plants, animals such as aquatic species, etc.).

<b>Biotechnology Systems Career Pathway</b>
BS.03.01.04.a. Define and summarize epigenetics and synthesize the relationship between mutation, migration and evolution of transgenes in the environment.
BS.03.01.01.b. Analyze and document the processes and describe the techniques used to produce transgenic eukaryotes (e.g., microbial synthetic biology, gene knockout therapy, traditional gene insertion, etc.).
BS.03.01.02.b. Assess and argue the pros and cons of transgenic species in agriculture.
BS.03.01.03.b. Research and evaluate genetic engineering procedures used in the production of living species.
BS.03.01.04.b. Analyze data to identify changes and patterns of transgenic species in the environment.
BS.03.01.01.c. Design and conduct experiments to evaluate an existing transgenic eukaryote.
BS.03.01.02.c. Transform plant or animal cells by performing a cellular transformation.
BS.03.01.03.c. Conduct field or clinical trials for genetically modified species.
BS.03.01.04.c. Conduct studies to track the movement of transgenes in the environment.
<b>BS.03.02. Apply biotechnology principles, techniques and processes to enhance the production of food through the use of microorganisms and enzymes.</b>
BS.03.02.01.a. Summarize reasons for detecting microbes and identify sources of microbes.
BS.03.02.02.a. Examine enzymes, the changes they cause and the physical and chemical parameters that affect enzymatic reactions (e.g., food, cellulosic bioenergy, etc.).
BS.03.02.03.a. Identify and categorize foods produced through the use of biotechnology (e.g., fermentation, etc.) to change the chemical properties of food for an intended purpose (e.g., create desirable nutritional profile, preservation, flavor, etc.).
BS.03.02.01.b. Assess and describe the use of biotechnology to detect microbes.
BS.03.02.02.b. Analyze processes by which enzymes are produced through biotechnology.
BS.03.02.03.b. Compare and contrast the effectiveness, purpose, and outcomes associated with biotechnology as well as conventional processes used in food processing.
BS.03.02.01.c. Design and perform an assay to detect a target microorganism in food, water or the environment.
BS.03.02.02.c. Conduct studies using scientific techniques to improve or discover enzymes for use in biotechnology (e.g., microbial strain selection).
BS.03.02.03.c. Process food using biotechnology to achieve an intended purpose (e.g., preservation, flavor enhancement, etc.).
<b>BS.03.03. Apply biotechnology principles, techniques and processes to protect the environment and maximize use of natural resources (e.g., biomass, bioprospecting, industrial biotechnology, etc.).</b>
BS.03.03.01.a. Examine the consequences of agricultural practices on natural populations.
BS.03.03.02.a. Define and summarize industrial biotechnology and categorize the benefits and risks associated with its use in manufacturing (e.g., fabrics, plastics, etc.).

<b>Biotechnology Systems Career Pathway</b>
BS.03.03.03.a. Research and summarize the potential applications of bioprospecting in biotechnology and agriculture.
BS.03.03.01.b. Analyze how biotechnology can be used to monitor the effects of agricultural practices on natural populations.
BS.03.03.02.b. Apply the processes used in the production of molecules for use in industrial applications.
BS.03.03.03.b. Assess and document the pros and cons of bioprospecting to achieve a research or product development objective.
BS.03.03.01.c. Evaluate the impact of modified organisms on the natural environment.
BS.03.03.02.c. Monitor and evaluate processes used in the synthesis of a molecule.
BS.03.03.03.c. Propose opportunities to use bioprospecting after weighing the short-term and long-term impacts on the environment.
<b>BS.03.04. Apply biotechnology principles, techniques and processes to enhance plant and animal care and production (e.g., selective breeding, pharmaceuticals, biodiversity, etc.).</b>
BS.03.04.01.a. Research and describe the aims and techniques involved in selective plant-breeding process.
BS.03.04.02.a. Examine and classify biotechnology processes applicable to animal health (e.g., genetic testing, etc.).
BS.03.04.03.a. Research and categorize the types of pharmaceuticals developed for animals and humans through biotechnology.
BS.03.04.04.a. Summarize the need for global biodiversity and applications of biotechnology to reduce threats to biodiversity.
BS.03.04.01.b. Choose techniques and identify tools used to monitor and direct plant breeding.
BS.03.04.02.b. Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.
BS.03.04.03.b. Distinguish the difference between plant-based and animal-based pharmaceuticals and describe their role in agriculture.
BS.03.04.04.b. Assess whether current threats to biodiversity will have an unsustainable impact on human populations.
BS.03.04.01.c. Perform plant-breeding techniques (e.g., plant tissue culture, etc.).
BS.03.04.02.c. Design animal-care protocols to ethically monitor and promote animal systems associated with biotechnology.
BS.03.04.03.c. Evaluate the process used to produce pharmaceuticals from transgenic organisms (e.g., hormones for animals, etc.).
BS.03.04.04.c. Select and utilize techniques to measure biodiversity in a population.
<b>BS.03.05. Apply biotechnology principles, techniques and processes to produce biofuels (e.g., fermentation, transesterification, methanogenesis, etc.).</b>
BS.03.05.01.a. Examine and synthesize the need for biofuels (e.g., cellulosic bioenergy, etc.).

<b>Biotechnology Systems Career Pathway</b>
BS.03.05.02.a. Differentiate between biomass and sources of biomass.
BS.03.05.03.a. Research and explain the process of fermentation and its potential applications.
BS.03.05.04.a. Define and summarize the process of transesterification and its potential applications.
BS.03.05.05.a. Examine the process of methanogenesis and its potential applications.
BS.03.05.01.b. Analyze the impact of the production and use of biofuels on the environment.
BS.03.05.02.b. Assess the characteristics of biomass that make it useful for biofuels production.
BS.03.05.03.b. Correlate the relationship between fermentation and the process used to produce alcohol from biomass.
BS.03.05.04.b. Analyze and document the process used to produce biodiesel from biomass.
BS.03.05.05.b. Analyze and describe the process used to produce methane from biomass.
BS.03.05.01.c. Evaluate and support how biofuels could solve a global issue (e.g., environmental, agricultural, etc.).
BS.03.05.02.c. Conduct a review of the technologies used to create biofuels from biomass and weigh the pros and cons of each method.
BS.03.05.03.c. Produce alcohol and co-products from biomass.
BS.03.05.04.c. Produce biodiesel and co-products from biomass.
BS.03.05.05.c. Produce methane and co-products from biomass.
BS.03.06. Apply biotechnology principles, techniques and processes to improve waste management (e.g., genetically modified organisms, bioremediation, etc.).
BS.03.06.01.a. Compare and contrast the use of natural organisms and genetically-engineered organisms in the treatment of wastes.
BS.03.06.02.a. Summarize the purpose of microorganisms in biological waste management.
BS.03.06.03.a. Analyze the role of microorganisms in industrial chemical waste treatment.
BS.03.06.04.a. Provide examples of instances in which bioremediation can be applied to clean up environmental contaminants.
BS.03.06.01.b. Analyze the process by which organisms are genetically engineered for waste treatment.
BS.03.06.02.b. Assess and describe the processes involved in biotreatment of biological wastes.
BS.03.06.03.b. Evaluate and describe the processes involved in biotreatment of industrial chemical wastes.
BS.03.06.04.b. Analyze and summarize the risks and benefits of using biotechnology for bioremediation.
BS.03.06.01.c. Conduct studies to evaluate the treatment of a waste product using a genetically engineered organism.

<b>Biotechnology Systems Career Pathway</b>
BS.03.06.02.c. Monitor and evaluate the treatment of biological wastes with microorganisms.
BS.03.06.03.c. Monitor and review the treatment of industrial chemical wastes with microorganisms.
BS.03.06.04.c. Design a bioremediation project including plans to evaluate the effectiveness of the effort.

<b>Environmental Service Systems Career Pathway</b>
<b>ESS.01. Use analytical procedures and instruments to manage environmental service systems.</b>
ESS.01.01. Analyze and interpret laboratory and field samples in environmental service systems.
ESS.01.01.01.a. Identify sample types and sampling techniques used to collect laboratory and field data.
ESS.01.01.02.a. Identify methods of statistical analysis commonly used in research (e.g., mean, standard deviation, standard error, error bars, etc.).
ESS.01.01.01.b. Determine the appropriate sampling techniques needed to generate data.
ESS.01.01.02.b. Summarize the purpose of statistical analysis methods commonly used in environmental service systems research and explain examples of their use in practice.
ESS.01.01.01.c. Collect and prepare sample measurements using appropriate data collection techniques.
ESS.01.01.02.c. Utilize data analysis to identify trends in a data sample and assess the confidence that can be drawn from those conclusions.
<b>ESS.01.02. Properly utilize scientific instruments in environmental monitoring situations (e.g., laboratory equipment, environmental monitoring instruments, etc.).</b>
ESS.01.02.01.a. Identify basic laboratory equipment and explain their uses.
ESS.01.02.02.a. Identify basic environmental monitoring instruments and explain their uses.
ESS.01.02.01.b. Demonstrate the proper use and maintenance of basic laboratory equipment.
ESS.01.02.02.b. Demonstrate the proper use and maintenance of environmental monitoring instruments.
ESS.01.02.01.c. Calibrate and use laboratory equipment according to standard operating procedures.
ESS.01.02.02.c. Calibrate and use environmental monitoring instruments according to standard operating procedures.
<b>ESS.02. Evaluate the impact of public policies and regulations on environmental service system operations.</b>
ESS.02.01. Interpret and evaluate the impact of laws, agencies, policies and practices affecting environmental service systems.
ESS.02.01.01.a. Distinguish between the types of laws associated with environmental service systems.

<b>Environmental Service Systems Career Pathway</b>
ESS.02.01.02.a. Distinguish between the types of government agencies (i.e., local, state and federal) associated with environmental service systems.
ESS.02.01.03.a. Research policies, practices and initiatives common in business and advocacy groups associated with environmental service systems (e.g., zero-waste, LEED-certified, locally-grown, etc.).
ESS.02.01.01.b. Analyze the structure of laws associated with environmental service systems.
ESS.02.01.02.b. Analyze the specific purpose of government agencies associated with environmental service systems.
ESS.02.01.03.b. Assess the intent, feasibility and effectiveness of policies, practices and initiatives common in business and advocacy groups associated with environmental service systems.
ESS.02.01.01.c. Evaluate the impact of laws associated with environmental service systems for their impact on wildlife, people, the environment and the economy.
ESS.02.01.02.c. Evaluate the impact and effectiveness of government agencies (i.e., local, state, and federal) associated with environmental service systems (e.g., regulation of consumption, prevention of damage to natural resources systems, management of ecological interactions, etc.).
ESS.02.01.03.c. Evaluate the impact of policies, practices and initiatives common in business and advocacy groups associated with environmental service systems on wildlife, people, the environment and the economy.
ESS.02.02. Compare and contrast the impact of current trends on regulation of environmental service systems (e.g., climate change, population growth, international trade, etc.).
ESS.02.02.01.a. Research and categorize the purpose, implementation and impact of greenhouse gas emission policies (e.g., cap-and-trade, emission offsetting, zero-emissions, carbon-neutrality, carbon sequestration, etc.).
ESS.02.02.02.a. Research the impact of environmental service systems regulations on international trade.
ESS.02.02.03.a. Examine and summarize the impact that population growth has on environmental service systems.
ESS.02.02.04.a. Research current policies related to fracking and shale oil gas.
ESS.02.02.01.b. Assess the effectiveness and impact of greenhouse gas emissions policies.
ESS.02.02.02.b. Analyze how environmental service systems regulations can both negatively and positively affect international trade.

<b>Environmental Service Systems Career Pathway</b>
ESS.02.02.03.b. Analyze the correlation between increased population size and the need for regulation of environmental service systems.
ESS.02.02.04.b. Assess whether current policies related to fracking and shale oil gas sufficiently address the needs of environmental service systems.
ESS.02.02.01.c. Devise new policies for controlling greenhouse gas emissions that reduce atmospheric carbon levels while generating additional economic activity.
ESS.02.02.02.c. Interpret and evaluate the impact of specific environmental service regulation policies (e.g., Clean Air Act, EISA, Clean Water Act, Superfund, etc.) on international trade.
ESS.02.02.03.c. Predict the impact of future population growth on the regulation of environmental service systems and evaluate how changes made today will impact future regulations.
ESS.02.02.04.c. Evaluate current fracking policies and create suggestions for modification of these policies to more thoroughly address the needs related to environmental, economic and social sustainability.
<b>ESS.02.03. Examine and summarize the impact of public perceptions and social movements on the regulation of environmental service systems.</b>
ESS.02.03.01.a. Research and summarize how the perception and regulation of environmental service systems has changed over time.
ESS.02.03.02.a. Examine how social views and movements (e.g., zero-waste philosophy, carbon footprints, recycling, etc.) have affected the implementation and need for regulation of environmental service systems.
ESS.02.03.01.b. Analyze and summarize specific changes to perceptions and regulations of environmental service systems and their impact on reducing the ecological, economical and sociological impact.
ESS.02.03.02.b. Assess the effectiveness of specific social movements related to regulation of environmental service systems.
ESS.02.03.01.c. Evaluate the impact of specific historical figures, or organizations, on the perception and regulation of environmental service systems.
ESS.02.03.02.c. Research current issues related to modern or future environmental service systems and devise strategies for engaging the public to address these issues through social movements.
<b>ESS.03. Develop proposed solutions to environmental issues, problems and applications using scientific principles of meteorology, soil science, hydrology, microbiology, chemistry and ecology.</b>

<b>Environmental Service Systems Career Pathway</b>
<b>ESS.03.01. Apply meteorology principles to environmental service systems.</b>
ESS.03.01.01.a. Distinguish between the different components and structural layers of the earth’s atmosphere.
ESS.03.01.02.a. Analyze how meteorological conditions influence air quality.
ESS.03.01.03.a. Research climate change and summarize evidence that climate change is occurring.
ESS.03.01.04.a. Examine and summarize factors that affect the earth’s balance of energy.
ESS.03.01.01.b. Differentiate how components of the atmosphere (e.g., weather systems and patterns, structure of the atmosphere, etc.) affect environmental service systems.
ESS.03.01.02.b. Analyze and articulate the relationship between meteorological conditions, air quality and air pollutants.
ESS.03.01.03.b. Assess the environmental, economic and social consequences of climate change.
ESS.03.01.04.b. Analyze the basics of the greenhouse effect and describe how the greenhouse effect alters the earth’s balance of energy.
ESS.03.01.01.c. Utilize meteorological data to assess the impact of atmospheric conditions on environmental service systems.
ESS.03.01.02.c. Interpret data measuring air pollution to determine its threat on human populations and ecological interactions.
ESS.03.01.03.c. Evaluate the predicted impacts of global climate change on environmental service systems.
ESS.03.01.04.c. Utilize data to predict and forecast future levels of greenhouse gas pollution and outline steps necessary to mitigate the resulting damage.
<b>ESS.03.02. Apply soil science and hydrology principles to environmental service systems.</b>
ESS.03.02.01.a. Differentiate and distinguish land uses, capability factors and land capability classes.
ESS.03.02.02.a. Research and describe the process of soil formation through weathering.
ESS.03.02.03.a. Examine and explain how the physical qualities of the soil influence the infiltration and percolation of water.
ESS.03.02.04.a. Summarize environmental hazards associated with groundwater supplies.
ESS.03.02.05.a. Research and summarize hydrogeology and differentiate between groundwater and surface water.
ESS.03.02.06.a. Research and describe how groundwater and surface water interactions affect the existence of wetlands.

<b>Environmental Service Systems Career Pathway</b>
ESS.03.02.01.b. Use a soil survey to determine the land capability classes for different parcels of land in an area.
ESS.03.02.02.b. Differentiate rock types and relate the chemical composition of mineral matter in soils to the parent material.
ESS.03.02.03.b. Assess the physical qualities of the soil that determine its potential for filtration of groundwater supplies and likelihood for flooding.
ESS.03.02.04.b. Assess the effectiveness of precautions taken to prevent or reduce contamination of groundwater supplies.
ESS.03.02.05.b. Analyze how interactions between groundwater and surface water affect flow and availability of water.
ESS.03.02.06.b. Analyze the importance of the roles played by wetlands in regards to water availability, prevention of flooding and other factors.
ESS.03.02.01.c. Design a master land-use management plan for a given area that utilizes land capability classes in order to minimize erosion and flooding, maximize development and preservation of topsoil, et cetera.
ESS.03.02.02.c. Evaluate the soil composition in order to predict the impact of that soil on environmental service systems.
ESS.03.02.03.c. Conduct tests of soil to determine its potential for filtration of groundwater supplies and likelihood for flooding.
ESS.03.02.04.c. Evaluate the methods used in a given example to protect groundwater supplies.
ESS.03.02.05.c. Construct explanations and solutions to situations involving the declining availability of water that incorporate groundwater flow equations as well as human activity.
ESS.03.02.06.c Evaluate and select strategies for wetlands preservation and restoration that maximize services provided by wetlands while taking human concerns into consideration.
<b>ESS.03.03. Apply chemistry principles to environmental service systems.</b>
ESS.03.03.01.a. Examine and summarize how chemistry affects soil structure and function (e.g., pH, cation-exchange capacity, filtration capability, flooding likelihood, etc.).
ESS.03.03.02.a. Examine and summarize how chemistry affects water quality and function (e.g., oxygen saturation, pH, biomagnification, etc.).
ESS.03.03.03.a. Examine and summarize how chemistry affects air quality and function (e.g., heat retention, formation of smog and acid rain, etc.).
ESS.03.03.04.a. Examine and summarize the relationship between water and soil chemistry and the formation of different kinds of wetlands (e.g., fens, peat bogs, potholes, etc.).

<b>Environmental Service Systems Career Pathway</b>
ESS.03.03.01.b. Analyze the soil chemistry of a sample.
ESS.03.03.02.b. Analyze the water chemistry of a sample.
ESS.03.03.03.b. Analyze how components of atmospheric chemistry (e.g., air chemical components, heat, moisture, etc.) affect air quality.
ESS.03.03.04.b. Assess how different kinds of wetlands are formed based on the different kinds of soil and water chemistry present in each case.
ESS.03.03.01.c. Evaluate a sample’s soil chemistry and assess how the results may impact considerations in environmental service systems.
ESS.03.03.02.c. Evaluate a sample’s water chemistry and assess how the results may impact considerations in environmental service systems.
ESS.03.03.03.c. Assess the impact of atmospheric chemistry on operational decisions in environmental service systems.
ESS.03.03.04.c. Evaluate the services provided by types of wetlands and predict how different types of wetlands respond to pressures due to human activity.
<b>ESS.03.04. Apply microbiology principles to environmental service systems.</b>
ESS.03.04.01.a. Describe the microbial biodiversity found in soil and summarize the contribution of microbial biodiversity to the physical and chemical characteristics of soil.
ESS.03.04.02.a. Research and describe how microbial populations in an ecosystem affect carbon cycling.
ESS.03.04.03.a. Examine and explain the role that microbes play in wastewater treatment.
ESS.03.04.04.a. Research the purposes of bioassay tests and describe potential applications for environmental service systems.
ESS.03.04.01.b. Assess how the activities of microorganisms in soil affect environmental service systems and ecosystem biodiversity.
ESS.03.04.02.b. Analyze the microbial populations present in an area and assess how carbon cycling is affected.
ESS.03.04.03.b. Assess the impact of wastewater treatment on environmental service systems.
ESS.03.04.04.b. Analyze procedures for a bio-assay test.
ESS.03.04.01.c. Evaluate how soil microorganisms in environmental service systems can be used to minimize waste, maximize nutrient cycling and increase ecosystem biodiversity.
ESS.03.04.02.c. Develop strategies for negating air pollutants based on soil microbial populations (e.g., carbon sequestration and rates of decomposition).

<b>Environmental Service Systems Career Pathway</b>
ESS.03.04.03.c. Evaluate modern uses of microbial waste water treatment and devise strategies to further reduce the environmental, economic and social impact of wastewater treatment.
ESS.03.04.04.c. Conduct bioassay tests related to environmental service systems and interpret results.
ESS.03.05. Apply ecology principles to environmental service systems.
ESS.03.05.01.a. Research the role that biodiversity plays in environmental service systems and how biodiversity can be measured.
ESS.03.05.02.a. Examine and explain the role played by habitats on environmental service systems.
ESS.03.05.03.a. Research and explain how carrying capacities relate to environmental service systems (e.g., waste processing, rate or production of pollution, disease, etc.).
ESS.03.05.04.a. Examine and describe how ecological interactions can be used to assess environmental service systems (i.e., macroinvertebrates and/or amphibians as bioindicators).
ESS.03.05.01.b. Calculate the amount of biodiversity in a given area using an appropriate method (e.g., quadrat assessment, transect measurements, etc.).
ESS.03.05.02.b. Assess the impact of the current rate of habitat loss on environmental service systems.
ESS.03.05.03.b. Assess and describe the impact of a population exceeding its carrying capacity on environmental service systems.
ESS.03.05.04.b. Evaluate the benefits and drawbacks of using bioindicator species in environmental service systems.
ESS.03.05.01.c. Evaluate the biodiversity of an area and predict the impact of changing the levels of biodiversity on environmental service systems.
ESS.03.05.02.c. Evaluate the importance of habitat to environmental service systems and devise strategies to minimize the future loss of habitats.
ESS.03.05.03.c. Devise a strategy for monitoring and supporting environmental service systems through management of a species' carrying capacity.
ESS.03.05.04.c. Utilize evidence from bioindicator species to detect pollutants in a given area.
ESS.04. Demonstrate the operation of environmental service systems (e.g., pollution control, water treatment, wastewater treatment, solid waste management and energy conservation).
ESS.04.01. Use pollution control measures to maintain a safe facility and environment.

<b>Environmental Service Systems Career Pathway</b>
ESS.04.01.01.a. Identify and distinguish types of pollution and distinguish between point source and nonpoint source pollution.
ESS.04.01.02.a. Research ways in which pollution can be managed and prevented and propose solutions to meet the needs of local systems.
ESS.04.01.03.a. Interpret the conditions necessary for waste to be labeled as hazardous.
ESS.04.01.01.b. Assess how industrial and nonindustrial pollution has damaged the environment.
ESS.04.01.02.b. Conduct tests to determine the presence and extent of pollution.
ESS.04.01.03.b. Classify examples of pollution as hazardous or nonhazardous.
ESS.04.01.01.c. Evaluate evidence for a given area for industrial and nonindustrial pollution.
ESS.04.01.02.c. Create a plan for pollution remediation, management or prevention for a given area.
ESS.04.01.03.c. Construct a plan for handling hazardous waste in given situations.
<b>ESS.04.02. Manage safe disposal of all categories of solid waste in environmental service systems.</b>
ESS.04.02.01.a. Compare and contrast different types of solid waste and options for treating solid waste.
ESS.04.02.02.a. Examine and describe the components of disposing waste in sanitary landfills.
ESS.04.02.03.a. Research and summarize the benefits and processes of composting.
ESS.04.02.04.a. Examine and describe the importance and potential impact of recycling.
ESS.04.02.01.b. Analyze environmental hazards created by different types of solid waste, solid waste accumulation and solid waste disposal.
ESS.04.02.02.b. Analyze and document basic sanitary landfill operating procedures and design.
ESS.04.02.03.b. Apply scientific principles to explain the benefits and processes of composting.
ESS.04.02.04.b. Analyze and document different recycling methods and classify materials that can be recycled.
ESS.04.02.01.c. Develop a plan for solid waste disposal for a given situation that considers the environmental hazards, economic realities and social concerns associated with this task.
ESS.04.02.02.c. Evaluate sanitary landfill procedures for environmental, economic and social sustainability.
ESS.04.02.03.c. Evaluate the appropriateness of composting methods in different situations.

<b>Environmental Service Systems Career Pathway</b>
ESS.04.02.04.c. Survey and evaluate recycling programs and procedures.
ESS.04.03. Apply techniques to ensure a safe supply of drinking water and adequate treatment of wastewater according to applicable rules and regulations.
ESS.04.03.01.a. Categorize chemical and physical properties of drinking water.
ESS.04.03.02.a. Research methods commonly used to treat wastewater and septic waste.
ESS.04.03.01.b. Analyze and document all steps in the public drinking water treatment process according to applicable standards.
ESS.04.03.02.b. Analyze and document the steps necessary to ensure that wastewater and septic waste can be safely released into the environment.
ESS.04.03.01.c. Evaluate samples of water and the processes necessary to verify that the samples are safe for consumption according to applicable standards.
ESS.04.03.02.c. Evaluate examples of wastewater and/or septic waste for its potential to cause environmental, economic and/or social problems.
ESS.04.04. Compare and contrast the impact of conventional and alternative energy sources on the environment and operation of environmental service systems.
ESS.04.04.01.a. Research conventional energy sources and list conservation measures to reduce the impact on environmental service systems.
ESS.04.04.02.a. Research alternative energy sources and describe the motivations for seeking alternatives to conventional energy sources as they relate to environmental monitoring.
ESS.04.04.03.a. Examine the factors that affect energy consumption and describe how these factors are related to environmental monitoring.
ESS.04.04.04.a. Research the impact on environmental service systems that occur because of energy consumption.
ESS.04.04.05.a. Examine and explain how energy consumption and the carbon cycle relate to environmental monitoring.
ESS.04.04.06.a. Research and describe the purpose and applications of life cycle assessments to environmental service systems.
ESS.04.04.01.b. Assess the advantages and disadvantages of conventional energy sources in regards to environmental service systems.
ESS.04.04.02.b. Identify advantages and disadvantages of alternative energy sources as they pertain to environmental service systems.
ESS.04.04.03.b. Analyze and document the main categories of energy consumption.

<b>Environmental Service Systems Career Pathway</b>
ESS.04.04.04.b. Analyze and document the most significant impacts that energy consumption has on environmental monitoring.
ESS.04.04.05.b. Calculate the impact of the carbon cycle imbalance (due to energy consumption) and assess how this imbalance affects environmental service systems.
ESS.04.04.06.b. Interpret a life cycle assessment and explain how it can be utilized in environmental service systems to assess the potential ecological impact of an energy source.
ESS.04.04.01.c. Evaluate the impact burning of fossil fuels has on environmental service systems.
ESS.04.04.02.c. Evaluate the impact alternative energy sources have on environmental conditions.
ESS.04.04.03.c. Evaluate strategies for reducing energy consumption to determine the most effective course of action based on the needs of environmental service systems.
ESS.04.04.04.c. Devise a strategy for improving future energy consumption in a manner consistent with the intents of environmental service systems.
ESS.04.04.05.c. Use data from environmental monitoring to evaluate methods for reducing the imbalance in the carbon cycle through changes to energy consumption.
ESS.04.04.06.c. Conduct a life cycle assessment for a given source of energy and use this assessment to determine the best option for energy in regards to environmental service systems.
<b>ESS.05. Use tools, equipment, machinery and technology common to tasks in environmental service systems.</b>
ESS.05.01. Use technological and mathematical tools to map land, facilities and infrastructure for environmental service systems.
ESS.05.01.01.a. Examine the importance and describe applications of surveying and mapping for environmental service systems.
ESS.05.01.02.a. Research the methods in which GIS can be used in environmental service systems (e.g., tracing of point pollution, control of the spread of invasive species, etc.).
ESS.05.01.03.a. Research how advancements in technology (e.g., unmanned aerial vehicles and drones, genetic modification, fracking, alternative energy, etc.) have changed environmental service systems.
ESS.05.01.01.b. Apply surveying and mapping principles to a situation involving environmental service systems and identify and explain the use of equipment for surveying and mapping.
ESS.05.01.02.b. Apply GIS skills to a situation specific to environmental service systems.

<b>Environmental Service Systems Career Pathway</b>
ESS.05.01.03.b. Analyze and document examples of utilization of breaking technology in environmental service systems.
ESS.05.01.01.c. Demonstrate surveying and cartographic skills to make site measurements in order to address concerns and needs within an environmental service systems situation.
ESS.05.01.02.c. Interpret and evaluate GIS data to come to a conclusion about a scenario specific to environmental service systems.
ESS.05.01.03.c. Evaluate trends in technology and develop predictions about how these advancements will change environmental service systems.
<b>ESS.05.02. Perform assessments of environmental conditions using equipment, machinery and technology.</b>
ESS.05.02.01.a. Research and summarize methods used to determine water quality (e.g., dissolved oxygen, chemical tests, macroinvertebrates, etc.) and determine if a source of water has been contaminated.
ESS.05.02.02.a. Research and summarize methods and tools used to measure soil health and determine if an area of land has been contaminated (e.g., soil probes, core monolith, soil fertility tests, etc.).
ESS.05.02.03.a. Research and summarize methods and tools used to determine air quality and determine if pollution is present (e.g., CO2 probe, particulate matter sampler, etc.).
ESS.05.02.04.a. Research and summarize methods used to determine ecological health and determine if an ecosystem is threatened (e.g., quadrat analysis, bioindicators, mark-recapture, etc.).
ESS.05.02.01.b. Assess different measurements of water quality to determine their effectiveness and limitations.
ESS.05.02.02.b. Assess different measurements of soil quality (e.g., soil horizons, soil texture, organic matter, soil respiration, etc.) to determine their effectiveness and limitations.
ESS.05.02.03.b. Assess different measurements of air quality (e.g., ozone, carbon monoxide, particulate matter, etc.) to determine their effectiveness and limitations.
ESS.05.02.04.b. Assess different measurements of assessing ecological health (e.g., quadrat biodiversity assessments, transect surveys, population counts, detection of disease and invasive species, etc.) to determine their effectiveness and limitations.
ESS.05.02.01.c. Evaluate a sample of water to determine its quality and if it has been contaminated.
ESS.05.02.02.c. Evaluate a sample of soil to determine its quality and if it has been contaminated.

<b>Environmental Service Systems Career Pathway</b>
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ESS.05.02.03.c. Perform an evaluation of air quality to determine and assess its impact of human and ecological populations.
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ESS.05.02.04.c. Evaluate a habitat to determine its ecological quality and if it is threatened.
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<b>Food Products and Processing Systems Career Pathway</b>
<b>FPP.01. Develop and implement procedures to ensure safety, sanitation and quality in food product and processing facilities.</b>
FPP.01.01. Analyze and manage operational and safety procedures in food products and processing facilities.
FPP.01.01.01.a. Research and summarize the purposes and objectives of safety programs in food products and processing facilities (e.g., Sanitation Standard Operating Procedures (SSOP); Good Manufacturing Practices (GMP); worker safety, etc.).
FPP.01.01.02.a. Research and categorize types of equipment used in food products and processing systems.
FPP.01.01.01.b. Analyze and document attributes and procedures of current safety programs in food products and processing facilities.
FPP.01.01.02.b. Assess specifications and maintenance needs for equipment and facilities used in food products and processing systems (e.g., specifications for machines, sanitation procedures, repair protocol, etc.).
FPP.01.01.01.c. Construct plans that ensure implementation of safety programs for food products and processing facilities.
FPP.01.01.02.c. Devise and implement strategies to maintain equipment and facilities for food products and processing systems.
<b>FPP.01.02. Apply food safety and sanitation procedures in the handling and processing of food products to ensure food quality.</b>
FPP.01.02.01.a. Examine and identify contamination hazards associated with food products and processing (e.g., physical, chemical and biological).
FPP.01.02.02.a. Research and summarize procedures of safe handling protocols (e.g., Hazard Analysis and Critical Control Points Plan (HACCP); Critical Control Point procedures (CCP); Good Agricultural Practices Plan (GAP), etc.).
FPP.01.02.03.a. Research and summarize the purposes and objectives of quality assurance tests on food products (e.g., produce safety regulation, safe food transport, food contaminants, etc.).
FPP.01.02.04.a. Describe the effects foodborne pathogens have on food products and humans.
FPP.01.02.01.b. Outline procedures to eliminate possible contamination hazards associated with food products and processing.
FPP.01.02.02.b. Construct plans that ensure implementation of safe handling procedures on food products.
FPP.01.02.03.b. Design and construct experiments for quality assurance tests on food products.
FPP.01.02.04.b. Explain, document and execute the procedures of microbiological tests used to detect food-borne pathogens.

<b>Food Products and Processing Systems Career Pathway</b>
FPP.01.02.01.c. Identify sources of contamination in food products and/or processing facilities and develop ways to eliminate contamination.
FPP.01.02.02.c. Examine, interpret and report outcomes from safe handling procedures and results from quality assurance tests.
FPP.01.02.03.c. Interpret and evaluate results of quality assurance tests on food products and examine steps to implement corrective procedures.
FPP.01.02.04.c. Conduct and interpret microbiological tests for food-borne pathogens.
<b>FPP.01.03. Apply food safety procedures when storing food products to ensure food quality.</b>
FPP.01.03.01.a. Identify and summarize purposes of food storage procedures (e.g., first in/first out, temperature regulation, monitoring, etc.).
FPP.01.03.02.a. Research and describe different electronic and paper-based documentation methods used to meet food safety and quality goals in food products and processing systems.
FPP.01.03.01.b. Analyze characteristics of food products and determine appropriate storage procedures.
FPP.01.03.02.b. Demonstrate and explain methods of documentation procedures within food products and processing systems.
FPP.01.03.01.c. Prepare plans that ensure implementation of proper food storage procedures.
FPP.01.03.02.c. Implement and evaluate the effectiveness of a documentation procedure used within a food products and processing facility and recommend improvements.
<b>FPP.02. Apply principles of nutrition, biology, microbiology, chemistry and human behavior to the development of food products.</b>
<b>FPP.02.01. Apply principles of nutrition and biology to develop food products that provide a safe, wholesome and nutritious food supply for local and global food systems.</b>
FPP.02.01.01.a. Research and summarize properties of common food constituents (e.g., proteins, carbohydrates, fats, vitamins, minerals).
FPP.02.01.02.a. Research and report methods of nutritional planning to meet essential needs for the human diet (e.g., MyPlate).
FPP.02.01.01.b. Compare and contrast the relative value of food constituents relative to food product qualities (e.g., taste, appearance, etc.).
FPP.02.01.02.b. Compare and contrast the nutritional needs of different human diets.
FPP.02.01.01.c. Analyze the properties of food products to identify food constituents and evaluate nutritional value.
FPP.02.01.02.c. Construct methods to design a healthy daily food guide for a variety of nutritional needs.
<b>FPP.02.02. Apply principles of microbiology and chemistry to develop food products to provide a safe, wholesome and nutritious food supply for local and global food systems.</b>
FPP.02.02.01.a. Examine and describe the basic chemical makeup of different types of food.

<b>Food Products and Processing Systems Career Pathway</b>
FPP.02.02.02.a. Identify common food additives and identify their properties (e.g., preservatives, antioxidants, buffers, stabilizers, colors, flavors, etc.).
FPP.02.02.03.a. Research and summarize the application of biochemistry in the development of new food products (e.g., value added food products, genetically engineered food products, etc.).
FPP.02.02.01.b. Explain how the chemical and physical properties of foods influence nutritional value and eating quality.
FPP.02.02.02.b. Describe the purpose of common food additives and how they influence the chemistry of food.
FPP.02.02.03.a. Analyze how food products and processing facilities use biochemistry concepts to develop new food products.
FPP.02.02.01.c. Design and conduct experiments to determine the chemical and physical properties of food products.
FPP.02.02.02.c. Devise and apply strategies to determine what additives are utilized and why they are included in a variety of food products.
FPP.02.02.03.a. Develop and implement plans to engineer new food items using biochemistry concepts.
<b>FPP.02.03. Apply principles of human behavior to develop food products to provide a safe, wholesome and nutritious food supply for local and global food systems.</b>
FPP.02.03.01.a. Examine and explain the importance of food labeling to the consumer.
FPP.02.03.02.a. Research and summarize relevant factors in planning and developing a new food product (e.g., regulation, creativity, economics, etc.).
FPP.02.03.01.b. Examine, interpret and explain the meaning of required components on a food label.
FPP.02.03.02.b. Determine consumer preference and market potential for a new food product using a variety of methods (e.g., double-blind testing, etc.).
FPP.02.03.01.c. Determine a strategy to prepare and label foods according to the established standards of regulatory agencies.
FPP.02.03.02.c. Design new food products that meet a variety of goals (e.g., consumer preferences, market, nutritional needs, regulatory requirements, etc.).
<b>FPP.03. Select and process food products for storage, distribution and consumption.</b>
<b>FPP.03.01. Implement selection, evaluation and inspection techniques to ensure safe and quality food products.</b>
FPP.03.01.01.a. Summarize characteristics of quality and yield grades of food products.
FPP.03.01.02.a. Summarize procedures to select raw food products based on yield grades and quality grades.
FPP.03.01.03.a. Identify and describe protocols for inspection and harvesting techniques for animal food products (e.g., pre-mortem and post-mortem inspections, Food Safety Inspection Service guidelines (FSIS), etc.).

<b>Food Products and Processing Systems Career Pathway</b>
FPP.03.01.04.a. Identify and describe foods derived from different classifications of food products (e.g., meat, egg, poultry, fish, dairy, fruits, vegetables, grains, legumes, oilseeds, etc.).
FPP.03.01.01.b. Analyze factors that affect quality and yield grades of food products.
FPP.03.01.02.b. Assemble procedures to perform quality-control inspections of raw food products for processing.
FPP.03.01.03.b. Examine and evaluate inspection and harvesting of animals using regulatory agency approved or industry-approved techniques.
FPP.03.01.04.b. Examine and summarize desirable qualities of food products derived from different classifications of food products.
FPP.03.01.01.c. Outline procedures to assign quality and yield grades to food products according to industry standards.
FPP.03.01.02.c. Develop, apply and evaluate care and handling procedures to maintain original food quality and yield.
FPP.03.01.03.c. Examine and respond to consumer concerns about the inspection and harvesting techniques of animals using accurate information based on regulatory agency approved or industry-approved techniques.
FPP.03.01.04.c. Evaluate and grade food products from different classifications of food products.
<b>FPP.03.02. Design and apply techniques of food processing, preservation, packaging and presentation for distribution and consumption of food products.</b>
FPP.03.02.01.a. Identify and explain English and metric measurements used in the food products and processing industry.
FPP.03.02.02.a. Differentiate between methods and materials used for processing food for different markets (e.g., fresh food products, ready to eat food products, etc.).
FPP.03.02.03.a. Identify methods of food preservation and give examples of foods preserved by each method.
FPP.03.02.04.a. Summarize types of materials and methods used in food packaging and presentation.
FPP.03.02.01.b. Compare weights and measurements of products and perform conversions between units of measure.
FPP.03.02.02.b. Outline appropriate methods and prepare foods for sale and distribution for different markets.
FPP.03.02.03.b. Analyze and document food preservation processes and methods on a variety of food products.
FPP.03.02.04.b. Analyze the degree of desirable food qualities of foods stored in various packaging.
FPP.03.02.01.c. Design plans to formulate and package food products using a variety of weights and measures.

<b>Food Products and Processing Systems Career Pathway</b>
FPP.03.02.02.c. Evaluate food quality factors on foods prepared for different markets (e.g., shelf life, shrinkage, appearance, weight, etc.).
FPP.03.02.03.c. Devise and apply strategies to preserve different foods using various methods and techniques.
FPP.03.02.04.c. Construct and implement methods of selecting packaging materials to store a variety of food products.
<b>FPP.03.03. Create food distribution plans and procedures to ensure safe delivery of food products.</b>
FPP.03.03.01.a. Assess and describe the environmental impact of distributing food locally and globally.
FPP.03.03.02.a. Examine the various paths food products take to get from food processing centers to consumers.
FPP.03.03.03.a. Research and summarize different types of market demands for food products (e.g., local food, organic, non-GMO, etc.).
FPP.03.03.01.b. Research and document ways to reduce environmental impact from food distribution activities.
FPP.03.03.02.b. Interpret safety procedures used in food distribution to ensure a safe product is being delivered to consumers.
FPP.03.03.03.b. Assess and explain how market demand for food products influences the distribution of food products.
FPP.03.03.01.c. Devise and defend a strategy to determine ways for food distribution to reduce environmental impacts.
FPP.03.03.02.c. Make recommendations to improve safety procedures used in food distribution scenarios to ensure a safe product is being delivered to consumers.
FPP.03.03.03.c. Propose distribution plans for food products that meet specific market demands.
<b>PP.04. Explain the scope of the food industry and the historical and current developments of food product and processing.</b>
<b>FPP.04.01. Examine the scope of the food industry by evaluating local and global policies, trends and customs for food production.</b>
FPP.04.01.01.a. Research and summarize examples of policy and legislation that affect food products and processing systems in the United States and around the world (e.g., labeling, GMOs, biosecurity, food system policy, dietary guidelines, etc.).
FPP.04.01.02.a. Examine the impact of consumer trends on food products and processing practices (e.g., health and nutrition, organic, information about food products, local food movements, farm-to-fork supply chains, food system transparency, etc.).
FPP.04.01.03.a. Compare and contrast cultural differences regarding food products and processing practices.

<b>Food Products and Processing Systems Career Pathway</b>
FPP.04.01.01.b. Analyze the similarities and differences amongst policies and legislation that affect the food products and processing system in the U.S. or around the world.
FPP.04.01.02.b. Construct and implement methods to obtain data on food consumer trends in a specific market.
FPP.04.01.03.b. Analyze food production and distribution outcomes based on cultural customs.
FPP.04.01.01.c. Articulate and defend a personal point of view on policies and legislation that affect the food products and processing system in the U.S. or around the world.
FPP.04.01.02.c. Devise and implement a strategy to create food products that meet a specific consumer trend in a specific market.
FPP.04.01.03.c. Propose and implement culturally sensitive food processing and distribution practices.
<b>FPP.04.02. Evaluate the significance and implications of changes and trends in the food products and processing industry in the local and global food systems.</b>
FPP.04.02.01.a. Describe and explain the components of the food products and processing industry (e.g., processing, distribution, byproducts, etc.).
FPP.04.02.02.a. Identify and explain environmental and safety concerns about the food supply.
FPP.04.02.03.a. Research and describe current and emerging technologies related to food products and processing (e.g., high pressure processing of foods, automation, biotechnology, etc.).
FPP.04.02.01.b. Analyze and document significant changes and trends in the food products and processing industry.
FPP.04.02.02.b. Research and summarize current issues related to the safety and environmental concerns about foods and food processing (e.g., GMOs, irradiation, microorganisms, contamination, etc.).
FPP.04.02.03.b. Evaluate desirable and undesirable outcomes of emerging technologies used in the food products and processing systems.
FPP.04.02.01.c. Predict and defend upcoming changes and trends in the food products and processing industry.
FPP.04.02.02.c. Examine and respond to consumer concerns about the environment and safety of the food supply using accurate information regarding food products and processing systems and practices.
FPP.04.02.03.c. Research and evaluate the feasibility of implementing a current or emerging technology to improve a current food product or process used in a facility.
<b>FPP.04.03. Identify and explain the purpose of industry organizations, groups and regulatory agencies that influence the local and global food systems.</b>
FPP.04.03.01.a. Examine and summarize the purposes of organizations that influence or regulate the food products and processing industry.

<b>Food Products and Processing Systems Career Pathway</b>
FPP.04.03.02.a. Examine and describe the importance and usage of regulatory oversight of food safety and security in food products and processing (e.g., internationally, nationally, state and local).
FPP.04.03.01.b. Evaluate the changes in the food products and processing industry brought about by industry organizations or regulatory agencies.
FPP.04.03.02.b. Assess and summarize the application of industry standards in the food products and processing industry.
FPP.04.03.01.c. Construct and implement methods to obtain data about organizations, groups and regulatory agencies that affect the food products and processing industry.
FPP.04.03.02.c. Construct and implement plans that ensure adherence to industry standards for food products and processing facilities.

<b>Natural Resources Systems Career Pathway</b>	
<b>NRS.01. Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.</b>	
NRS.01.01. Apply methods of classification to examine natural resource availability and ecosystem function in a particular region.	
NRS.01.01.01.a. Summarize and classify the different kinds of natural resources using common classification schemes (e.g., living versus non-living, renewable versus nonrenewable, native versus introduced, etc.).	
NRS.01.01.02.a. Summarize the components that comprise all ecosystems.	
NRS.01.01.03.a. Summarize and classify different kinds of living species based on evolutionary traits.	
NRS.01.01.01.b. Assess the characteristics of a natural resource to determine its classification.	
NRS.01.01.02.b. Analyze the interdependence of organisms within an ecosystem (e.g., food webs, niches, impact of keystone species, etc.) and assess the dependence of organisms on nonliving components (climate, geography, energy flow, nutrient cycling, etc.).	
NRS.01.01.03.b. Analyze how biodiversity develops through evolution, natural selection and adaptation; explain the importance of biodiversity to ecosystem function and availability of natural resources.	
NRS.01.01.01.c. Devise strategies for the preservation of natural resources based on their classification.	
NRS.01.01.02.c. Conduct analyses of ecosystems and document the interactions of living species and non-living resources.	
NRS.01.01.03.c. Evaluate biodiversity in ecosystems and devise strategies to enhance the function of an ecosystem and the availability of natural resources by increasing the level of biodiversity.	
<b>NRS.01.02. Classify different types of natural resources in order to enable protection, conservation, enhancement and management in a particular geographical region.</b>	
NRS.01.02.01.a. Research and examine the characteristics used to identify trees and woody plants.	
NRS.01.02.02.a. Research and examine the characteristics used to identify herbaceous plants.	
NRS.01.02.03.a. Research and examine the characteristics used to identify wildlife and insects.	
NRS.01.02.04.a. Research and examine the characteristics used to identify aquatic species.	
NRS.01.02.05.a. Research and examine the characteristics used to identify non-living resources (e.g., soil types, climate, geography, etc.).	
NRS.01.02.06.a. Research the purpose and value of resource inventories and population studies.	

<b>Natural Resources Systems Career Pathway</b>
NRS.01.02.01.b. Apply identification techniques to determine the species of a tree or woody plant.
NRS.01.02.02.b. Apply identification techniques to determine the species of an herbaceous plant.
NRS.01.02.03.b. Apply identification techniques to determine the species of wildlife or insect.
NRS.01.02.04.b. Apply identification techniques to determine the species of an aquatic organism.
NRS.01.02.05.b. Apply identification techniques to determine the types of non-living resources in an area.
NRS.01.02.06.b. Apply procedures for conducting resource inventories and population studies.
NRS.01.02.01.c. Evaluate the species of trees present to assess the health of an ecosystem (e.g., presence of native versus invasive species, biodiversity, etc.).
NRS.01.02.02.c. Evaluate the species of herbaceous plants present to assess the health of an ecosystem (e.g., presence of native versus invasive plants, biodiversity, etc.).
NRS.01.02.03.c. Evaluate the species of wildlife and insects present to assess the health of an ecosystem.
NRS.01.02.04.c. Evaluate the aquatic species present to assess the health of an ecosystem.
NRS.01.02.05.c. Evaluate the non-living resources present in an area to determine the best practices for improving, enhancing and protecting an ecosystem.
NRS.01.02.06.c. Conduct an assessment of the resource inventories or population in a given area.
<b>NRS.01.03. Apply ecological concepts and principles to atmospheric natural resource systems.</b>
NRS.01.03.01.a. Classify different kinds of biogeochemical cycles and the role they play in natural resources systems.
NRS.01.03.02.a. Research and summarize how climate factors influence natural resource systems.
NRS.01.03.01.b. Assess the role that the atmosphere plays in the regulation of biogeochemical cycles.
NRS.01.03.02.b. Analyze the impact that climate has on natural resources and debate how this impact has changed due to human activity.
NRS.01.03.01.c. Evaluate and make recommendations to lessen the impact of human activity on the ability of the atmosphere to regulate biogeochemical cycles.
NRS.01.03.02.c. Assess the primary causes of climate change and design strategies to lessen its impact on natural resource systems.
<b>NRS.01.04. Apply ecological concepts and principles to aquatic natural resource systems.</b>
NRS.01.04.01.a. Summarize the roles and properties of watersheds.

<b>Natural Resources Systems Career Pathway</b>
NRS.01.04.02.a. Examine and describe the importance of groundwater and surface water to natural resources.
NRS.01.04.03.a. Compare and contrast riparian zones and riparian buffers based on their function.
NRS.01.04.01.b. Assess the function of watersheds and their effect on natural resources.
NRS.01.04.02.b. Analyze how different classifications of ground and surface water affect ecosystem function.
NRS.01.04.03.b. Assess techniques used in the creation, enhancement and management of riparian zones and riparian buffers.
NRS.01.04.01.c. Evaluate and defend the importance of watersheds to ecosystem function.
NRS.01.04.02.c. Devise and apply strategies to manage, protect, enhance or improve sources of groundwater or surface water based on its properties.
NRS.01.04.03.c. Devise and apply strategies for the creation, enhancement and management of riparian zones and riparian buffers.
<b>NRS.01.05. Apply ecological concepts and principles to terrestrial natural resource systems.</b>
NRS.01.05.01.a. Research and describe the stages of ecological succession.
NRS.01.05.02.a. Compare and contrast the impact of habitat disturbances and habitat resilience.
NRS.01.05.03.a. Compare and contrast techniques associated with sustainable forestry (e.g., timber stand improvement, diversity improvement, reforestation, etc.).
NRS.01.05.04.a. Compare and contrast techniques associated with soil management (e.g., soil survey and interpretation, erosion control, etc.).
NRS.01.05.01.b. Analyze and summarize examples of stages of succession.
NRS.01.05.02.b. Analyze and summarize examples of habitat disturbances and habitat resilience.
NRS.01.05.03.b. Analyze a forest in order to determine which forestry techniques would improve that habitat.
NRS.01.05.04.b. Analyze a plot of land in order to determine which soil management techniques would be most applicable.
NRS.01.05.01.c. Evaluate the stages of succession present in an ecosystem and predict which species will become more prevalent through future stages of succession.
NRS.01.05.02.c. Interpret signs of habitat disturbances and resilience in an ecosystem and use these signs to assess the health of an ecosystem.
NRS.01.05.03.c. Devise a forest management plan that improves the habitat while sustainably maximizing the amount of timber that can be harvested.
NRS.01.05.04.c. Devise a soil management plan to minimize erosion and maximize biodiversity, plant productivity, and the formation of topsoil.
<b>NRS.01.06. Apply ecological concepts and principles to living organisms in natural resource systems.</b>

<b>Natural Resources Systems Career Pathway</b>
NRS.01.06.01.a. Differentiate between population ecology, population density and population dispersion and describe the importance of these concepts to natural resource systems.
NRS.01.06.02.a. Research and summarize examples of invasive species.
NRS.01.06.01.b. Analyze the factors that influence population density and population dispersion in natural resource systems.
NRS.01.06.02.b. Analyze factors that influence the establishment and spread of invasive species and determine the appropriate steps to prevent or minimize the impact of invasive species.
NRS.01.06.01.c. Create a management plan for a population of a species in an ecosystem given its population ecology, population density and population dispersion in natural resource systems.
NRS.01.06.02.c. Evaluate the presence and impact of invasive species on natural resources in a given area and devise a plan to prevent, control or eliminate invasive species from that habitat.
<b>NRS.02.01. Analyze the interrelationships between natural resources and humans.</b>
NRS.02.01. Examine and interpret the purpose, enforcement, impact and effectiveness of laws and agencies related to natural resource management, protection, enhancement and improvement (e.g., water regulations, game laws, historic preservation laws, environmental policy, etc.).
NRS.02.01.01.a. Distinguish between the types of laws associated with natural resources systems.
NRS.02.01.02.a. Distinguish between the types of agencies associated with natural resources systems.
NRS.02.01.01.b. Analyze the structure of laws associated with natural resources systems.
NRS.02.01.02.b. Analyze the specific purpose of agencies associated with natural resources systems.
NRS.02.01.01.c. Evaluate the impact of laws associated with natural resources systems (e.g., mitigation, water regulations, carbon emissions, game limits, invasive species, etc.).
NRS.02.01.02.c. Evaluate the impact and effectiveness of agencies associated with natural resources systems (e.g., regulation of consumption, prevention of damage to natural resources systems, management of ecological interactions, etc.).
<b>NRS.02.02. Assess the impact of human activities on the availability of natural resources.</b>
NRS.02.02.01.a. Summarize the relationship between natural resources, ecosystems and human activity.
NRS.02.02.02.a. Categorize the primary causes of extinction of living species due to human activity (e.g., overharvesting, habitat loss, invasive species, pollution, etc.).
NRS.02.02.03.a. Examine and describe the manner in which modern lifestyles are related to the depletion of natural resources.

<b>Natural Resources Systems Career Pathway</b>
NRS.02.02.01.b. Assess and explain how different kinds of human activity affect the use and availability of natural resources (i.e., agriculture, industry, transportation, etc.).
NRS.02.02.02.b. Assess causes of extinction and describe how those causes related to loss of biodiversity.
NRS.02.02.03.b. Identify solutions to improve the sustainability of modern lifestyles.
NRS.02.02.01.c. Evaluate how the availability of natural resources can be improved through changes to human activity.
NRS.02.02.02.c. Devise a strategy for preventing the loss of species and biodiversity that takes into account the primary causes of species extinction from human activity.
NRS.02.02.03.c. Evaluate how modern lifestyles affect resource consumption and energy use and devise a strategy to prevent the complete loss of a natural resource.
NRS.02.03. Analyze how modern perceptions of natural resource management, protection, enhancement and improvement change and develop over time.
NRS.02.03.01.a. Summarize and categorize the different social considerations in regards to the use of natural resources (e.g., public versus private, laws and regulations, economics, green technology, etc.).
NRS.02.03.02.a. Research and assess how historical figures played a prominent role in shaping how natural resources are viewed and used today (e.g., Aldo Leopold, Teddy Roosevelt, John Muir, Rachel Carson, Gaylord Nelson, etc.).
NRS.02.03.03.a. Research how technology has affected the use and views of natural resources.
NRS.02.03.01.b. Analyze how social considerations can affect the use and sustainability of natural resources.
NRS.02.03.02.b. Examine and describe the relationship between current trends in natural resource systems and historical figures that played a prominent role in shaping how natural resources are viewed and used today.
NRS.02.03.03.b. Analyze and document how some technological advancements changed how natural resources were used and viewed (e.g., Industrial Revolution, fossil fuels, green technology, etc.).
NRS.02.03.01.c. Develop predictions for how the management, protection, enhancement and improvement of natural resources will evolve through social considerations (e.g., establishment of national parks, public opinion, and fishing, reduction of waste and energy consumption, etc.).
NRS.02.03.02.c. Anticipate and predict how society’s views and use of natural resources will continue to change as a result of historical figures and trends in modern society.
NRS.02.03.03.c. Anticipate and predict how future technological advancements may affect the use and views of natural resources.
NRS.02.04. Examine and explain how economics affects the use of natural resources.

<b>Natural Resources Systems Career Pathway</b>
NRS.02.04.01.a. Compare and contrast how the economic value of a natural resource affects its availability.
NRS.02.04.02.a. Research the impact of the use of natural resources on local, state and national economies (e.g., outdoor recreation, energy production, preservation, etc.).
NRS.02.04.03.a. Compare and contrast the economic impact of green technology and alternative energy.
NRS.02.04.01.b. Assess whether economic value increases or decreases the conservation, protection, improvement and enhancement of natural resources.
NRS.02.04.02.b. Assess the importance of the use of natural resources on local, state and national economies.
NRS.02.04.03.b. Analyze and document how the adoption of green technology and/or alternative energy affected a local, state or national economy.
NRS.02.04.01.c. Devise a plan to improve the conservation, protection, improvement and enhancement of natural resources based on economic value and practices.
NRS.02.04.02.c. Anticipate and predict how changes to the availability of natural resources because of human activity may impact a local, state and national economy.
NRS.02.04.03.c. Anticipate and predict the economic impact green technology and alternative energy.
<b>NRS.02.05. Communicate information to the public regarding topics related to the management, protection, enhancement, and improvement of natural resources.</b>
NRS.02.05.01.a. Examine and describe ways in which a message regarding natural resources may be communicated to the public through standard media sources (e.g., press, radio, TV, public appearances, etc.).
NRS.02.05.02.a. Research and summarize how social media and the Internet have changed how people perceive and utilize natural resources (e.g., greater awareness of conservation issues, calls to action, etc.).
NRS.02.05.03.a. Examine and describe how communication can be used to influence behavior, call people to action and instill a sense of civic behavior related to the conservation, management, enhancement and improvement of natural resources.
NRS.02.05.01.b. Assess the effectiveness of different methods for communicating natural resource messages.
NRS.02.05.02.b. Assess how to most effectively communicate a message about the conservation, management, enhancement and improvement of natural resources via social media and the Internet.
NRS.02.05.03.b. Analyze and summarize examples of how communication can be used to influence behavior, call people to action and instill a sense of civic behavior related to the conservation, management, enhancement and improvement of natural resources.
NRS.02.05.01.c. Devise and implement a strategy for communicating a natural resources message through media.

<b>Natural Resources Systems Career Pathway</b>
NRS.02.05.02.c. Anticipate and predict how messages about the conservation, management, enhancement and improvement of natural resources will change because of social media and the Internet.
NRS.02.05.03.c. Create a communication plan to influence the behavior of people, call people to action and instill a sense of civic behavior related to the conservation, management, enhancement and improvement of natural resources.
<b>NRS.03. Develop plans to ensure sustainable production and processing of natural resources.</b>
NRS.03.01. Sustainably produce, harvest, process and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.).
NRS.03.01.01.a. Summarize forest harvesting methods.
NRS.03.01.02.a. Research and describe methods by which wildlife can be sustainably harvested (e.g., controlled harvests, hunting licenses, regulations, etc.).
NRS.03.01.03.a. Compare and contrast the costs and benefits (e.g., impacts on environment, economic, wildlife, etc.) of mineral extraction to a local, state and/or national economy.
NRS.03.01.04.a. Compare and contrast the costs and benefits (e.g., impacts on environment, economic, wildlife, etc.) of fossil fuels to a local, state and/or national economy.
NRS.03.01.05.a. Compare and contrast the costs and benefits (e.g., environmental impacts, etc.) of shale oil from fracking to a local, state and/or national economy.
NRS.03.01.06.a. Compare and contrast the costs and benefits (e.g., environmental impacts, etc.) of alternative sources of energy (e.g., hydroelectric, solar, wind, biofuels, geothermal, etc.).
NRS.03.01.07.a. Research and summarize how recreational uses of natural resources can be changed to improve sustainability.
NRS.03.01.08.a. Categorize aquatic species used for commercial and recreational purposes.
NRS.03.01.01.b. Assess harvesting methods in regards to their economic value, environmental impact, and other factors.
NRS.03.01.02.b. Assess and apply techniques used to harvest wildlife in regards to sustainability, practicality and other factors.
NRS.03.01.03.b. Assess the economic impact of mineral extraction in regards to the costs and benefits to a local, state and/or national economy.
NRS.03.01.04.b. Assess the economic impact of fossil fuel extraction in regards to the costs and benefits to a local, state and/or national economy.
NRS.03.01.05.b. Assess the economic impact of shale oil extraction (i.e., fracking) in regards to the costs and benefits to a local, state and/or national economy.
NRS.03.01.06.b. Assess and evaluate factors that affect the economic, environmental and social sustainability in regards to the use of alternative sources of energy.

<b>Natural Resources Systems Career Pathway</b>
NRS.03.01.07.b. Assess different options for improving the sustainability of outdoor recreation based on its impact on natural resources and likelihood of acceptance.
NRS.03.01.08.b. Analyze and apply techniques used to acquire aquatic species for their environmental, economic and social sustainability.
NRS.03.01.01.c. Develop a forest harvesting plan that ensures economic, environmental and social sustainability.
NRS.03.01.02.c. Develop a method for the sustainable harvest of wildlife species.
NRS.03.01.03.c. Evaluate methods used to extract and process minerals for economic, environmental and social sustainability.
NRS.03.01.04.c. Evaluate methods used to extract and process fossil fuels for economic, environmental and social sustainability.
NRS.03.01.05.c. Evaluate methods used to extract and process shale oil for economic, environmental and social sustainability.
NRS.03.01.06.c. Assess trends in energy production and consumption in order to predict how the impact of alternative energy will change in the future.
NRS.03.01.07.c. Evaluate an example of outdoor recreation and develop suggestions for how that activity can be made more sustainable in a manner that is acceptable to those who take part in that activity.
NRS.03.01.08.c. Develop recommendations for the sustainable harvest of aquatic species.
NRS.03.02. Demonstrate cartographic skills, tools and technologies to aid in developing, implementing and evaluating natural resource management plans.
NRS.03.02.01.a. Summarize how to use maps and technologies to identify directions and land features, calculate actual distance and determine the elevations of points.
NRS.03.02.02.a. Summarize how GIS can be used to manage, conserve, improve and enhance the natural resources of an area.
NRS.03.02.01.b. Apply cartographic skills and tools and technologies (e.g., land surveys, geographic coordinate systems, etc.) to locate natural resources.
NRS.03.02.02.b. Analyze an area’s resources using GIS technologies.
NRS.03.02.01.c. Evaluate the availability of and threats to natural resources using cartographic skills, tools, and technologies (e.g., spread of invasive species, movement of wildlife populations, changes to biodiversity of edge of habitat versus interior, etc.).
NRS.03.02.02.c. Use GIS data for a given area to devise a management plan for the management, conservation, improvement, and enhancement of its natural resources.
NRS.04. Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.
NRS.04.01.01.a. Identify and categorize different kinds of streams.
NRS.04.01.02.a. Identify and categorize characteristics of a healthy forest.
NRS.04.01.03.a. Identify and categorize characteristics of a healthy wildlife habitat.
NRS.04.01.04.a. Identify and categorize characteristics of healthy rangeland.

<b>Natural Resources Systems Career Pathway</b>
NRS.04.01.05.a. Identify and categorize characteristics of natural resources that make them desirable for recreational purposes.
NRS.04.01.06.a. Identify and categorize characteristics of healthy marine and coastal natural resources.
NRS.04.01.01.b. Assess and explain indicators of the biological health of a stream.
NRS.04.01.02.b. Assess and apply the methods used to improve a forest stand.
NRS.04.01.03.b. Assess and apply methods of wildlife habitat improvement.
NRS.04.01.04.b. Assess and apply methods of rangeland improvement.
NRS.04.01.05.b. Assess and apply management techniques for improving outdoor recreation opportunities.
NRS.04.01.06.b. Assess and apply methods to improve marine and coastal natural resources.
NRS.04.01.01.c. Create an enhancement plan for a stream.
NRS.04.01.02.c. Create a timber stand improvement plan for a forest.
NRS.04.01.03.c. Devise a comprehensive improvement plan for a wildlife habitat.
NRS.04.01.04.c. Evaluate and revise a rangeland management plan.
NRS.04.01.05.c. Evaluate the impact of recreational activities on natural resources and create an improvement plan.
NRS.04.01.06.c. Create an improvement plan for marine or coastal natural resources.
NRS.04.02. Diagnose plant and wildlife diseases and follow protocols to prevent their spread.
NRS.04.02.01.a. Classify causes of diseases in plants and the correct authorities to whom some diseases should be reported.
NRS.04.02.02.a. Classify causes of diseases in wildlife and aquatic species and determine the correct authorities to whom some diseases should be reported.
NRS.04.02.01.b. Analyze a plant disease based on its symptoms, identify if the disease needs to be reported to authorities and determine which authorities it should be reported to.
NRS.04.02.02.b. Analyze a wildlife or aquatic species disease based on its symptoms, identify if the disease needs to be reported to authorities and determine which authorities it should be reported to.
NRS.04.02.01.c. Create a management plan to reduce infection and the spread of plant diseases in natural resource systems.
NRS.04.02.02.c. Create a management plan to reduce infection and spread of wildlife or aquatic species diseases in natural resource systems.
NRS.04.03. Prevent or manage introduction of ecologically harmful species in a particular region.
NRS.04.03.01.a. Categorize harmful and beneficial insects, as well as signs of insect damage to natural resources.
NRS.04.03.02.a. Identify and classify invasive species common to a particular region.

<b>Natural Resources Systems Career Pathway</b>
NRS.04.03.03.a. Research and summarize strategies and benefits of preventing the introduction of harmful species to a particular region.
NRS.04.03.01.b. Analyze signs of insect infestation, identify if it needs to be reported to authorities and determine which authorities it should be reported to.
NRS.04.03.02.b. Analyze signs of the spread of invasive species, identify if it needs to be reported to authorities and determine which authorities it should be reported to.
NRS.04.03.03.b. Assess and implement a plan for preventing the spread of harmful species for its effectiveness.
NRS.04.03.01.c. Create a management plan to reduce spread of harmful insects in natural resource systems.
NRS.04.03.02.c. Create a management plan to reduce spread of harmful invasive species in natural resource systems.
NRS.04.03.03.c. Identify potentially invasive species and devise strategies to prevent ecological damage that would result from the introduction of that species.
<b>NRS.04.04. Manage fires in natural resource systems.</b>
NRS.04.04.01.a. Differentiate between desirable and undesirable fires and research the role fire plays in a healthy ecosystem.
NRS.04.04.02.a. Research and summarize how fire management techniques have evolved.
NRS.04.04.01.b. Assess and apply techniques used to fight wildfires, manage prescribed fires and ensure human safety.
NRS.04.04.02.b. Assess the effectiveness of techniques previously and currently used to prevent harmful fires.
NRS.04.04.01.c. Develop a prevention plan for harmful fires for a particular region.
NRS.04.04.02.c. Anticipate and predict how fire management techniques will evolve in the future.

<b>Plant Systems Career Pathway</b>
<b>PS.01. Develop and implement a crop management plan for a given production goal that accounts for environmental factors.</b>
PS.01.01. Determine the influence of environmental factors on plant growth.
PS.01.01.01.a. Identify and summarize the three measurements of light – color, intensity and duration – that affect plant growth.
PS.01.01.02.a. Identify and summarize the effects of air and temperature on plant metabolism and growth.
PS.01.01.03.a. Identify and summarize the effects of water quality on plant growth, (e.g., pH, dissolved solids, etc.).
PS.01.01.01.b. Analyze and describe plant responses to light color, intensity and duration.
PS.01.01.02.b. Determine the optimal air and temperature conditions for plant growth.
PS.01.01.03.b. Analyze and describe plant responses to water conditions.
PS.01.01.01.c. Analyze plant responses to varied light color, intensity and duration and recommend modifications to light for desired plant growth.
PS.01.01.02.c. Design, implement and evaluate a plan to maintain optimal air and temperature conditions for plant growth.
PS.01.01.03.c. Analyze plant responses to water conditions and recommend modifications to water for desired plant growth.
<b>PS.01.02. Prepare and manage growing media for use in plant systems.</b>
PS.01.02.01.a. Identify the major components of growing media and describe how growing media support plant growth.
PS.01.02.02.a. Identify the categories of soil water.
PS.01.02.01.b. Describe the physical and chemical characteristics of growing media and explain the influence they have on plant growth.
PS.01.02.02.b. Discuss how soil drainage and water-holding capacity can be improved.
PS.01.02.01.c. Formulate and prepare growing media for specific plants or crops.
PS.01.02.02.c. Determine the hydraulic conductivity for soil and how the results influence irrigation practices.
<b>PS.01.03. Develop and implement a fertilization plan for specific plants or crops.</b>
PS.01.03.01.a. Identify the essential nutrients for plant growth and development and their major functions (e.g., nitrogen, phosphorous, potassium, etc.).
PS.01.03.02.a. Discuss the influence of pH and cation exchange capacity on the availability of nutrients.
PS.01.03.03.a. Collect soil and plant tissue samples using generally accepted procedures and explain how incorrect sample collection will affect the results of a laboratory analysis.
PS.01.03.04.a. Identify fertilizer sources of essential plant nutrients; explain fertilizer formulations, including organic and inorganic; and describe different methods of fertilizer application.

<b>Plant Systems Career Pathway</b>
PS.01.03.05.a. Research and summarize production methods focused on soil management (e.g., crop rotation, companion planting, cover crops, etc.).
PS.01.03.06.a. Summarize the impact of environmental factors on nutrient availability (e.g., moisture, temperature, pH, etc.).
PS.01.03.01.b. Analyze the effects of nutrient deficiencies and symptoms and recognize environmental causes of nutrient deficiencies.
PS.01.03.02.b. Contrast pH and cation exchange capacity between mineral soil and soilless growing media.
PS.01.03.03.b. Interpret laboratory analyses of soil and tissue samples.
PS.01.03.04.b. Calculate the amount of fertilizer to be applied based on nutrient recommendation and fertilizer analysis.
PS.01.03.05.b. Assess and describe the short and long-term effects production methods have on soil.
PS.01.03.06.b. Assess and describe the impact environmental factors have on a crop.
PS.01.03.01.c. Monitor plants for signs of nutrient deficiencies and prepare a scouting report to correct elements negatively affecting plant growth in a field or greenhouse.
PS.01.03.02.c. Adjust the pH of growing media for specific plants or crops.
PS.01.03.03.c. Prescribe fertilizer applications based on the results of a laboratory analysis of soil and plant tissue samples.
PS.01.03.04.c. Calibrate application equipment to meet plant nutrient needs.
PS.01.03.05.c. Devise a plan for soil management for a selected production method.
PS.01.03.06.c. Devise a plan to meet plant nutrient needs based on environmental factors present.
<b>PS.02. Apply principles of classification, plant anatomy, and plant physiology to plant production and management.</b>
PS.02.01. Classify plants according to taxonomic systems.
PS.02.01.01.a. Identify and summarize systems used to classify plants based on specific characteristics.
PS.02.01.02.a. Describe the morphological characteristics used to identify agricultural and herbaceous plants (e.g., life cycles, growth habit, plant use and as monocotyledons or dicotyledons, woody, herbaceous, etc.).
PS.02.01.01.b. Compare and contrast the hierarchical classification of agricultural and ornamental plants.
PS.02.01.02.b. Identify and describe important plants to agricultural and ornamental plant systems by common names.
PS.02.01.01.c. Classify agricultural and ornamental plants according to the hierarchical classification system.
PS.02.01.02.c. Identify and describe important plants to agricultural and ornamental plant systems by scientific names.

<b>Plant Systems Career Pathway</b>
PS.02.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.
PS.02.02.01.a. Identify structures in a typical plant cell and summarize the function of plant cell organelles.
PS.02.02.02.a. Identify and summarize the components, the types and the functions of plant roots.
PS.02.02.03.a. Identify and summarize the components and the functions of plant stems.
PS.02.02.04.a. Research and summarize leaf morphology and the functions of leaves.
PS.02.02.05.a. Identify and summarize the components of a flower, the functions of a flower and the functions of flower components.
PS.02.02.06.a. Identify and summarize the functions and components of seeds and fruit.
PS.02.02.01.b. Compare and contrast mitosis and meiosis.
PS.02.02.02.b. Analyze root tissues and explain the pathway of water and nutrients into and through root tissues.
PS.02.02.03.b. Analyze and describe the difference in arrangement of vascular tissue between monocot and dicot plant stems.
PS.02.02.04.b. Analyze how leaves capture light energy and summarize the exchange of gases.
PS.02.02.05.b. Apply knowledge of flower structure to differentiate between the types of flowers and flower inflorescence (e.g., complete, incomplete, perfect, imperfect).
PS.02.02.06.b. Analyze and categorize the major types of seeds and fruit.
PS.02.02.01.c. Apply the knowledge of cell differentiation and the functions of the major types of cells to plant systems.
PS.02.02.02.c. Correlate the active and passive transport of minerals into and through the root system to plant nutrition.
PS.02.02.03.c. Evaluate the function of the xylem, phloem and cambium tissues and the impact on plant systems.
PS.02.02.04.c. Devise a plan for plant management practices that takes into account leaf structure and functions.
PS.02.02.05.c. Evaluate flower structures and analyze the impact of plant structure on plant breeding, production and use.
PS.02.02.06.c. Evaluate the impact of different seed and fruit structures to plant culture and use.
PS.02.03. Apply knowledge of plant physiology and energy conversion to plant systems.
PS.02.03.01.a. Summarize the importance of photosynthesis to plant life on earth and the process of photosynthesis, including the types (c3, c4, Cam), its stages (e.g., light-dependent and light independent reactions), and its products and byproducts.
PS.02.03.02.a. Summarize the stages of cellular respiration including their products and byproducts.

<b>Plant Systems Career Pathway</b>
PS.02.03.03.a. Summarize primary growth and the role of the apical meristem.
PS.02.03.04.a. Identify and categorize the five groups of naturally occurring plant hormones and synthetic plant growth regulators.
PS.02.03.05.a. Compare and contrast the effects of transpiration, translocation and assimilation on plants.
PS.02.03.01.b. Apply knowledge of photosynthesis to analyze how various environmental factors will affect the rate of photosynthesis.
PS.02.03.02.b. Analyze the factors that affect cellular respiration processes and rate in a crop production setting.
PS.02.03.03.b. Analyze plant growth and assess the process of secondary plant growth.
PS.02.03.04.b. Analyze and identify the plant responses to plant growth regulators and different forms of tropism.
PS.02.03.05.b. Identify and analyze the factors affecting transpiration, translocation and assimilation rate and products.
PS.02.03.01.c. Evaluate the impact of photosynthesis and the factors that affect it on plant management, culture and production problems.
PS.02.03.02.c. Evaluate the impact of plant respiration on plant growth, crop management and post-harvest handling decisions.
PS.02.03.03.c. Relate the principles of primary and secondary growth to plant systems.
PS.02.03.04.c. Select and defend the use of specific plant growth regulators to produce desired responses from plants.
PS.02.03.05.c. Devise plans for plant management that applies knowledge of transpiration, translocation and assimilation on plant growth.
<b>PS.03. Propagate, culture and harvest plants and plant products based on current industry standards.</b>
<b>PS.03.01. Demonstrate plant propagation techniques in plant system activities.</b>
PS.03.01.01.a. Identify examples of and summarize pollination, cross-pollination and self-pollination of flowering plants.
PS.03.01.02.a. Demonstrate sowing techniques for providing favorable conditions to meet the factors of seed germination.
PS.03.01.03.a. Summarize optimal conditions for asexual propagation and demonstrate techniques used to propagate plants by cuttings, division, separation, layering, budding and grafting.
PS.03.01.04.a. Define micropropagation, discuss advantages associated with the practice and summarize the main stages of the process.
PS.03.01.05.a. Summarize the principles of recombinant DNA technology and the basic steps in the process.
PS.03.01.01.b. Examine and apply the process of plant pollination and/or fertilization.

<b>Plant Systems Career Pathway</b>
PS.03.01.02.b. Handle seed to overcome seed dormancy mechanisms and to maintain seed viability and vigor.
PS.03.01.03.b. Manage the plant environment to support asexual reproduction.
PS.03.01.04.b. Demonstrate aseptic micropropagation techniques.
PS.03.01.05.b. Compare and contrast the potential risks and advantages associated with genetically modified plants.
PS.03.01.01.c. Select and defend the use of pollination methods and practices used to maximize crop pollination.
PS.03.01.02.c. Conduct tests associated with seed germination rates, viability and vigor.
PS.03.01.03.c. Evaluate asexual propagation practices based on productivity and efficiency.
PS.03.01.04.c. Propagate plants by micropropagation.
PS.03.01.05.c. Evaluate the impact of using genetically modified crops on other production practices.
<b>PS.03.02. Develop and implement a management plan for plant production.</b>
PS.03.02.01.a. Research and summarize the importance of starting with pest- and disease-free propagation material.
PS.03.02.02.a. List and summarize the reasons for preparing growing media before planting.
PS.03.02.03.a. Determine seeding rate need for specified plant population or desired quantity of finished plants.
PS.03.02.04.a. Observe and record environmental conditions during the germination, growth and development of a crop.
PS.03.02.05.a. Summarize the stages of plant growth and the reasons for controlling plant growth.
PS.03.02.06.a. Identify and categorize structures and technologies used for controlled atmosphere production of plants.
PS.03.02.07.a. Summarize the use of hydroponic and aquaponic systems for plant production.
PS.03.02.01.b. Inspect propagation material for evidence of pests or disease.
PS.03.02.02.b. Prepare soil and growing media for planting with the addition of amendments.
PS.03.02.03.b. Apply pre-plant treatments required of seeds and plants and evaluate the results.
PS.03.02.04.b. Monitor the progress of plantings and determine the need to adjust environmental conditions.
PS.03.02.05.b. Demonstrate proper techniques to control and manage plant growth through mechanical, cultural or chemical means.
PS.03.02.06.b. Compare and contrast the types of technologies used for controlled atmosphere production.

<b>Plant Systems Career Pathway</b>
PS.03.02.07.b. Compare and contrast the types of systems used in hydroponic and aquaponic plant production.
PS.03.02.01.c. Produce pest- and disease-free propagation material.
PS.03.02.02.c. Analyze how mechanical planting equipment performs soil preparation and seed placement.
PS.03.02.03.c. Adjust and calibrate mechanized seeding and/or planting equipment for desired seed application rate.
PS.03.02.04.c. Prepare and implement a plant production schedule based on predicted environmental conditions and desired market target (e.g., having plants ready to market on a specific day such as Mother’s Day, organic production, low maintenance landscape plants, etc.).
PS.03.02.05.c. Prepare plant production schedules utilizing plant growth knowledge to get plants to their optimal growth stage at a given time.
PS.03.02.06.c. Research, select and defend technology for use in controlled atmosphere production.
PS.03.02.07.c. Research, select and defend the use of a hydroponic or aquaponic plant system.
IPS.03.03. Develop and implement a plan for integrated pest management for plant production.
PS.03.03.01.a. Identify and categorize plant pests, diseases and disorders.
PS.03.03.02.a. Diagram the life cycle of major plant pests and diseases.
PS.03.03.03.a. Identify and summarize pest control strategies associated with integrated pest management and the importance of determining economic threshold.
PS.03.03.04.a. Distinguish between risks and benefits associated with the materials and methods used in plant pest management.
PS.03.03.01.b. Identify and analyze major local weeds, insect pests and infectious and noninfectious plant diseases.
PS.03.03.02.b. Predict pest and disease problems based on environmental conditions and life cycles.
PS.03.03.03.b. Demonstrate pesticide formulations including organic and synthetic active ingredients and selection of pesticide to control specific pest.
PS.03.03.04.b. Examine and apply procedures for the safe handling, use and storage of pesticides including personal protective equipment and reentry interval.
PS.03.03.01.c. Devise solutions for plant pests, diseases and disorders.
PS.03.03.02.c. Design and implement a crop scouting program.
PS.03.03.03.c. Employ pest management strategies to manage pest populations, assess the effectiveness of the plan and adjust the plan as needed.
PS.03.03.04.c. Evaluate environmental and consumer concerns regarding pest management strategies.

<b>Plant Systems Career Pathway</b>
PS.03.04. Apply principles and practices of sustainable agriculture to plant production.
PS.03.04.01.a. Compare and contrast the alignment of different production systems (conventional and organic) with USDA sustainable practices criteria.
PS.03.04.02.a. Summarize national/international and local/regional food production systems.
PS.03.04.03.a. Identify and summarize impacts of environmental conditions on plants.
PS.03.04.01.b. Analyze the alignment of modern technologies used in production systems (e.g., precision agriculture, GE crops, etc.) with USDA sustainable practices criteria.
PS.03.04.02.b. Compare and contrast the impact on greenhouse gas, carbon footprint of the national/international production system with local/regional production system markets.
PS.03.04.03.b. Compare and contrast differing research conclusions related to environmental factors and their effect on plants.
PS.03.04.01.c. Research, prepare and defend plans for a plant systems enterprise that aligns with USDA sustainable practices criteria.
PS.03.04.02.c. Select and defend the use of nationally/internationally grown or locally/regionally grown for a production operation system.
PS.03.04.03.c. Evaluate evidence supporting claims on how environmental conditions effect plants.
PS.03.05. Harvest, handle and store crops according to current industry standards.
PS.03.05.01.a. Identify and summarize harvesting methods and equipment.
PS.03.05.02.a. Research and summarize reasons for calculating crop loss and or damage.
PS.03.05.03.a. Research and summarize how safety is ensured at each stage of the following processes: harvesting, processing and storing.
PS.03.05.04.a. Identify and categorize plant preparation methods for storing and shipping plants and plant products.
PS.03.05.05.a. Summarize the reasons for preparing plants and plant products for distribution.
PS.03.05.01.b. Assess the stage of growth to determine crop maturity or marketability and demonstrate proper harvesting techniques.
PS.03.05.02.b. Evaluate crop yield and loss data and make recommendations to reduce crop loss.
PS.03.05.03.b. Research and analyze practices used to maintain a safe product through harvest, processing, storage and shipment (e.g., Food Safety Modernization Act, Good Agricultural Practices, etc.).
PS.03.05.04.b. Analyze the proper conditions required to maintain the quality of plants and plant products held in storage and during shipping.
PS.03.05.05.b. Demonstrate techniques for grading, handling and packaging plants and plant products for distribution.
PS.03.05.01.c. Analyze the processed used by mechanical harvesting equipment.

<b>Plant Systems Career Pathway</b>
PS.03.05.02.c. Implement and evaluate the effectiveness of plans to reduce crop loss.
PS.03.05.03.c. Research laws and apply regulations to ensure the production of plants and plant products that are safe for distribution and use.
PS.03.05.04.c. Monitor and evaluate environmental conditions in storage facilities for plants and plant products.
PS.03.05.05.c. Evaluate techniques for grading, handling and packaging plants and plant products.
<b>PS.04. Apply principles of design in plant systems to enhance an environment (e.g. floral, forest landscape, and farm).</b>
<b>PS.04.01. Evaluating, identifying and preparing plants to enhance an environment.</b>
PS.04.01.01.a. Identify and categorize plants by their purpose (e.g., floral plants, landscape plants, house plants, etc.).
PS.04.01.02.a. Summarize the applications of design in agriculture and ornamental plant systems.
PS.04.01.01.b. Demonstrate proper use of plants in their environment (e.g., focal and filler plants in floriculture, heat tolerant and shade plants in a landscape design, etc.).
PS.04.01.02.b. Create a design utilizing plants in their proper environments.
PS.04.01.01.c. Install plants according to a design plan that uses the proper plants based on the situation and environment.
PS.04.01.02.c. Evaluate a design and provide feedback and suggestions for improvement (e.g., a floral arrangement, a landscape or a landscape plan, etc.).
<b>PS.04.02. Create designs using plants.</b>
PS.04.02.01.a. Research and summarize the principles and elements of design for use in plant systems.
PS.04.02.02.a. Identify and categorize tools used for design (e.g., computer landscape software, drawing tools, florist tools, etc.).
PS.04.02.03.a. Explain the concept of landscape ecology and summarize factors that shape the ecology of a landscape (e.g., composition, structure, function, etc.).
PS.04.02.01.b. Apply principles and elements of design that form the basis of artistic impression.
PS.04.02.02.b. Demonstrate the use of tools used for creating designs.
PS.04.02.03.b. Research and provide examples of ecological factors incorporated into landscape designs.
PS.04.02.01.c. Analyze designs to identify use of design principles and elements.
PS.04.02.02.c. Choose and properly use appropriate tools to create a desired design.
PS.04.02.03.c. Utilize green technologies and sustainable practices that prevent or limit negative environmental impacts.

<b>Power, Structural, and Technical Systems Career Pathway</b>
<b>PST.01. Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural and technical systems.</b>
PST.01.01. Apply physical science and engineering principles to assess and select energy sources for AFNR power, structural and technical systems.
PST.01.01.01.a. Research and identify renewable and nonrenewable energy sources used in AFNR.
PST.01.01.02.a. Compare and contrast the pathways of delivery for renewable and nonrenewable energy sources in an AFNR enterprise or business.
PST.01.01.03.a. Summarize methods and compare and contrast units used to benchmark energy use of AFNR structures (e.g., EUIs, BTUs, etc.).
PST.01.01.01.b. Assess the environmental impacts of renewable and nonrenewable energy sources used in AFNR.
PST.01.01.02.b. Calculate the costs of using renewable and nonrenewable energy sources in an AFNR enterprise or business.
PST.01.01.03.b. Convert energy utilized in an AFNR structure to an energy utilization index (e.g., convert CCF, KWH, etc. to Btu consumption per square foot, etc.).
PST.01.01.01.c. Design and implement methods to evaluate the efficiency of renewable and nonrenewable energy sources used in AFNR.
PST.01.01.02.c. Devise a strategy to incorporate the use of selected energy sources in an AFNR enterprise or business.
PST.01.01.03.c. Apply energy benchmarking data to examine and select methods to conserve energy in AFNR structures.
<b>PST.01.02. Apply physical science and engineering principles to design, implement and improve safe and efficient mechanical systems in AFNR situations.</b>
PST.01.02.01.a. Compare and contrast applications of simple machines in AFNR related mechanical systems.
PST.01.02.02.a. Identify the tools, machines and equipment needed to construct and/or fabricate a project in AFNR.
PST.01.02.03.a. Examine owner’s manuals to classify the types of safety hazards associated with different mechanical systems used in AFNR (e.g., caution, warning, danger, etc.).
PST.01.02.01.b. Perform mathematical calculations to determine the mechanical advantage of simple machines in AFNR related mechanical systems.
PST.01.02.02.b. Calculate the maintenance and purchase cost of tools, machines and equipment used in AFNR.
PST.01.02.03.b. Select, maintain and demonstrate the proper use of tools, machines and equipment used in different AFNR related mechanical systems.
PST.01.02.01.c. Apply the scientific method to devise strategies to improve the efficiency of operation of AFNR related mechanical systems.

<b>Power, Structural, and Technical Systems Career Pathway</b>
PST.01.02.02.c. Devise and document processes to safely implement and evaluate the safe use of AFNR related tools, machinery and equipment.
PST.01.02.02.c. Devise and document processes to safely implement and evaluate the safe use of AFNR related tools, machinery and equipment.
<b>PST.02. Operate and maintain AFNR mechanical equipment and power systems.</b>
<b>PST.02.01. Perform preventative maintenance and scheduled service to maintain equipment, machinery and power units used in AFNR settings.</b>
PST.02.01.01.a. Maintain the cleanliness and appearance of equipment, machinery and power units used in AFNR power, structural and technical systems to assure proper functionality.
PST.02.01.02.a. Examine operator’s manuals to determine recommendations for servicing filtration systems and maintaining fluid levels on equipment, machinery and power units used in AFNR power, structural and technical systems.
PST.02.01.01.b. Develop a preventative maintenance schedule for equipment, machinery and power units used in AFNR power, structural and technical systems.
PST.02.01.02.b. Service filtration systems and maintain fluid levels on equipment, machinery and power units in accordance with operator’s manuals.
PST.02.01.01.c. Devise a strategy to communicate to different audiences, preventative maintenance and service schedule for equipment, machinery and power units used in AFNR power, structural and technical systems.
PST.02.01.02.c. Assess and adjust equipment (e.g., belts and drives, chains, sprockets, etc.) and maintain fluid conveyance components (e.g., hoses, lines, nozzles, etc.) to ensure proper functioning.
<b>PST.02.02. Operate machinery and equipment while observing all safety precautions in AFNR settings.</b>
PST.02.02.01.a. Research and summarize the use of equipment, machinery and power units for AFNR power, structural and technical systems.
PST.02.02.02.a. Examine and identify safety hazards associated with equipment, machinery and power units used in AFNR power, structural, and technical systems (e.g., caution, warning, danger, etc.).
PST.02.02.01.b. Analyze and calculate the cost of using equipment, machinery, and power units for AFNR power, structural and technical systems.
PST.02.02.02.b. Apply safety principles and applicable regulations to operate equipment, machinery and power units used in AFNR power, structural and technical systems.
PST.02.02.01.c. Perform pre-operation inspections, start-up & shut-down procedures on equipment, machinery and power units as specified in owner’s manuals.
PST.02.02.02.c. Adjust equipment, machinery and power units for safe and efficient operation in AFNR power, structural and technical systems.
<b>PST.03. Service and repair AFNR mechanical equipment and power systems.</b>

<b>Power, Structural, and Technical Systems Career Pathway</b>
PST.03.01.01.a. Identify and classify components of internal combustion engines used in AFNR power, structural and technical systems.
PST.03.01.02.a. Distinguish the characteristics of spark-and-compression internal combustion engines used in AFNR power, structural and technical systems.
PST.03.01.01.b. Analyze and explain how the components of internal combustion engines interrelate during operation.
PST.03.01.02.b. Utilize technical manuals and diagnostic tools to determine service and repair needs of spark-and-compression internal combustion engines used in AFNR power, structural and technical systems.
PST.03.01.01.c. Evaluate service and repair needs for internal combustion engines using a variety of performance tests (e.g., manuals, computer-based diagnostics, etc.).
PST.03.01.02.c. Inspect, analyze and repair spark-and-compression internal combustion engines used in AFNR power, structural and technical systems.
<b>PST.03.02. Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.</b>
PST.03.02.01.a. Compare and contrast basic units of electricity (e.g., volts, amps, watts, and ohms) and the principles that describe their relationship (e.g., Ohm’s Law, Power Law, etc.).
PST.03.02.02.a. Compare and contrast the characteristics of electronic components used in AFNR power, structural and technical systems (e.g., battery, resistor, diode, transistor, capacitor, etc.).
PST.03.02.03.a. Classify the uses of electrical sensors and controls in AFNR power, structural and technical systems.
PST.03.02.01.b. Assess the tools used to measure the basic units of electrical circuits in AFNR power, structural and technical systems, and perform the measurements.
PST.03.02.02.b. Analyze and interpret electrical system symbols and diagrams.
PST.03.02.03.b. Distinguish and select materials and tools used in electrical control circuit installation.
PST.03.02.01.c. Analyze and design electrical circuits for AFNR power, structural and technical systems using knowledge of the basic units of electricity.
PST.03.02.02.c. Conduct testing procedures to evaluate and repair malfunctioning electrical components and systems used in AFNR power, structural and technical systems.
PST.03.02.03.c. Plan and install electrical control circuits and/or circuit boards to assure proper operation within AFNR power, structural and technical systems.
<b>PST.03.03. Utilize manufacturers’ guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).</b>
PST.03.03.01.a. Research and summarize the applications of common types of hydraulic and pneumatic systems used in AFNR power, structural and technical systems.

<b>Power, Structural, and Technical Systems Career Pathway</b>
PST.03.03.02.a. Compare and contrast operation principles and features of mechanical transmission systems used in AFNR power, structural and technical systems (e.g., belts, chains, gears, bearings, seals, universals, drive shafts, etc.).
PST.03.03.03.a. Identify and examine the components of suspension and steering systems used in AFNR power, structural and technical systems.
PST.03.03.01.b. Analyze and interpret hydraulic and pneumatic system symbols and diagrams used in AFNR power, structural and technical systems.
PST.03.03.02.b. Utilize speed, torque and power measurements to calculate efficiency in power transmission systems used in AFNR power, structural and technical systems.
PST.03.03.03.b. Assess and analyze vehicle and machinery performance related to suspension and steering systems used in AFNR power, structural and technical systems.
PST.03.03.01.c. Inspect, analyze and repair hydraulic and pneumatic system components used in AFNR power, structural and technical systems.
PST.03.03.02.c. Inspect, analyze and repair the components of power transmission systems used in AFNR power, structural and technical systems.
PST.03.03.03.c. Inspect, analyze and repair vehicle suspension and steering systems used in AFNR power, structural and technical systems.
<b>PST.04. Plan, build and maintain AFNR structures.</b>
<b>PST.04.01. Create sketches and plans for AFNR structures.</b>
PST.04.01.01.a. Interpret and explain the meaning of symbols used in sketches of agricultural structures.
PST.04.01.02.a. Read and interpret the parts and/or views of plans for agricultural structures.
PST.04.01.01.b. Apply scale measurement and dimension to develop sketches of agricultural structures.
PST.04.04.02.b. Construct plans for agricultural structures using current technology (e.g., drafting software, computer-aided design, etc.).
PST.04.01.01.c. Create sketches of an agricultural structure by applying principles of design.
PST.04.01.02.c. Evaluate, plan and design functional and efficient facilities for use in AFNR power, structural and technical systems.
<b>PST.04.02. Determine structural requirements, specifications and estimate costs for AFNR structures.</b>
PST.04.02.01.a. Summarize and categorize the information needed to complete a bill of materials and cost estimate for an AFNR structure.
PST.04.02.02.a. Research and summarize sources of industry construction and materials standards and their importance (e.g., American National Standards Institute, ANSI, Underwriters’ Laboratories, UL, etc.).
PST.04.02.01.b. Analyze a project plan to prepare a bill of materials and an estimate of material costs.

<b>Power, Structural, and Technical Systems Career Pathway</b>
PST.04.02.02.b. Assess and analyze local building code requirements for agriculture structures.
PST.04.02.01.c. Create a project cost estimate, including materials, labor and management for an AFNR structure.
PST.04.02.02.c. Design and conduct a building functionality and safety assessment on an agricultural structure using knowledge of industry standards and local code requirements.
PST.04.03. Follow architectural and mechanical plans to construct, maintain and/or repair AFNR structures (e.g., material selection, site preparation and/or layout, plumbing, concrete/ masonry, etc.).
PST.04.03.01.a. Examine the criteria in selecting materials for constructing, maintaining, and/or repairing AFNR structures.
PST.04.03.02.a. Summarize the characteristics needed for an ideal building site.
PST.04.03.03.a. Compare and contrast the characteristics of wood and/or metal products used in AFNR structures.
PST.04.03.04.a. Compare and contrast the characteristics of materials used in plumbing and water systems (e.g., copper, PVC, PEX, etc.).
PST.04.03.05.a. Compare and contrast the characteristics of fencing materials, including government regulations and applicable installation codes.
PST.04.03.06.a. Summarize the characteristics of the components found in concrete.
PST.04.03.07.a. Differentiate between types of insulation materials used in AFNR structures.
PST.04.03.01.b. Analyze and assess samples of materials or products for quality and efficiency of workmanship.
PST.04.03.02.b. Complete a building site analysis checklist to select an ideal building site.
PST.04.04.03.b. Calculate costs associated with the repair and replacement of wood and/or metal components an AFNR structure.
PST.04.03.04.b. Calculate the cost of a water system in an AFNR structure (e.g., copper, PVC, etc.).
PST.04.03.05.b. Measure and calculate the cost of fencing materials.
PST.04.03.06.b. Calculate volume for concrete projects.
PST.04.03.07.b. Calculate BTU loss in an AFNR structure.
PST.04.03.01.c. Select materials for a project based upon an analysis of the project and the quality of the materials.
PST.04.03.02.c. Assess site characteristics, identify adjustments, and demonstrate procedures for preparing a building site.
PST.04.03.03.c. Construct AFNR structures using wood and/or metal materials.
PST.04.03.04.c. Install and/or repair pipes and plumbing equipment and fixtures in AFNR structures.
PST.04.03.05.c. Construct, maintain, and/or repair fencing, including wood, static wire, electrical wire and other fencing materials.

<b>Power, Structural, and Technical Systems Career Pathway</b>
PST.04.03.06.c. Construct, maintain and/or repair AFNR structures with concrete, brick, stone or masonry.
PST.04.03.07.c. Insulate a structure and estimate reduced BTU loss.
PST.04.04. Apply electrical wiring principles in AFNR structures.
PST.04.04.01.a. Compare and contrast direct and alternating current.
PST.04.04.02.a. Distinguish electrical circuits and the components of each.
PST.04.04.01.b. Assess and analyze the electrical requirements of an AFNR structure.
PST.04.04.02.b. Calculate the cost of operating an electrical motor.
PST.04.04.01.c. Install and/or repair fixtures following appropriate codes and standards.
PST.04.04.02.c. Plan and wire electrical circuits (i.e., single pole switch, three-way switch, duplex outlet, etc.).
<b>PST.05. Use control, monitoring, geospatial and other technologies in AFNR power, structural and technical systems.</b>
PST.05.01. Apply computer and other technologies (e.g., robotics, CNC, UAS, etc.) to solve problems and increase the efficiency of AFNR systems.
PST.05.01.01.a. Research and categorize computer technologies used to solve problems and increase efficiency in AFNR systems.
PST.05.03.02.a. Examine and summarize the specific intent of technologies used to solve problems and increase the efficiency of AFNR systems (e.g., robotics, UAS, CNC, etc.).
PST.05.01.01.b. Analyze data using computer programs and other current technologies used in AFNR systems.
PST.05.03.02.b. Calculate the change in efficiency after using technologies in AFNR systems.
PST.05.01.01.c. Solve problems and calculate changes in efficiency using computer technologies for AFNR systems.
PST.05.03.02.c. Solve problems and evaluate changes in efficiency and create recommendations for the use of technologies in AFNR systems.
PST.05.02. Prepare and/or use electrical drawings to design, install and troubleshoot electronic control systems in AFNR settings.
PST.05.02.01.a. Examine and categorize electrical control system components used in AFNR systems (e.g., transistors, relays, HVAC, logic controllers, etc.).
PST.05.02.02.a. Differentiate between the purpose of electrical sensors and controls used in AFNR power, structural and technical systems.
PST.05.02.03.a. Research and summarize the importance of AFNR power, structural and technical control systems using programmable logic controllers (PLC) and/or other computer-based systems.
PST.05.02.01.b. Analyze schematic drawings for electrical control systems used in AFNR systems.
PST.05.02.02.b. Interpret maintenance schedules for electrical control systems used in AFNR power, structural and technical systems.

<b>Power, Structural, and Technical Systems Career Pathway</b>
PST.05.02.03.b. Assess the functions of AFNR power, structural and technical control systems using programmable logic controllers (PLC) in agricultural production and manufacturing.
PST.05.02.01.c. Design schematic drawings for electrical control systems used in AFNR systems.
PST.05.02.02.c. Troubleshoot electrical control system performance problems found in AFNR power, structural and technical systems.
PST.05.02.03.c. Develop and implement AFNR power, structural and technical control systems using programmable logic controllers (PLC) and/or other computer-based systems.
PST.05.03. Apply geospatial technologies to solve problems and increase the efficiency of AFNR systems.
PST.05.03.01.a. Research and summarize the impact of utilizing geospatial technologies (i.e., GPS, GIS, remote sensing, telematics, etc.) in AFNR systems.
PST.05.03.02.a. Examine the components of precision technologies used in AFNR systems.
PST.05.03.01.b. Analyze and interpret trends in data collected utilizing geospatial technologies.
PST.05.03.02.b. Analyze and calculate the economic impact of utilizing precision technologies (e.g., GPS/GIS) in AFNR systems.
PST.05.03.01.c. Collect data and create maps utilizing geospatial technologies.
PST.05.03.02.c. Install, maintain and service instrumentation and equipment used for precision technologies (i.e., GPS receivers, yield monitors, remote sensors, etc.) used in AFNR systems.

For additional information: <http://thecouncil.ffa.org/afnr>

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<b>Core Standard 1:</b>		<b>1</b>	<b>Business Law:</b> Understands business’s responsibility to know, abide by, and enforce laws and regulations that affect business operations and transactions.
Performance Element	1.1		<i>Acquire foundational knowledge of business laws and regulations.</i>
Performance Indicator	1.1.1		Describe ways to implement business laws and regulations.
Performance Element	1.2		<i>Apply knowledge of business ownership to establish and continue business operations.</i>
Performance Indicator	1.2.1		Research types of business ownership.

<b>Core Standard 2:</b>		<b>2</b>	<b>Communication Skills:</b> Understands the concepts, strategies, and systems used to obtain and convey ideas and information.
Performance Element	2.1		<i>Interpret meaning from written material and to apply the information to a task.</i>
Performance Indicator	2.1.1		Identify sources that provide relevant, valid written material.
Performance Indicator	2.1.2		Extract relevant information from written materials.
Performance Indicator	2.1.3		Apply written directions to achieve tasks.
Performance Indicator	2.1.4		Analyze company resources to determine policies and procedures.
Performance Element	2.2		<i>Demonstrate active listening skills to determine meaning of what is being said.</i>
Performance Indicator	2.2.1		Explain communication techniques that support and encourage a speaker.
Performance Indicator	2.2.2		Follow oral directions.
Performance Indicator	2.2.3		Demonstrate active listening skills.
Performance Element	2.3		<i>Apply verbal skills to obtain and convey information.</i>
Performance Indicator	2.3.1		Explain the nature of effective verbal communications.
Performance Indicator	2.3.2		Demonstrate relevant questioning skills.
Performance Indicator	2.3.3		Interpret others' nonverbal cue.
Performance Indicator	2.3.4		Provide legitimate responses to inquiries.
Performance Indicator	2.3.5		Provide verbal directions.
Performance Indicator	2.3.6		Demonstrate communication styles appropriate to target audience.
Performance Indicator	2.3.7		Defend ideas objectively.
Performance Indicator	2.3.8		Handle telephone calls in a businesslike manner.
Performance Indicator	2.3.9		Participate in group discussions.
Performance Element	2.4		<i>Record information to maintain and present a report of business activity.</i>
Performance Indicator	2.4.1		Utilize note-taking strategies.
Performance Indicator	2.4.2		Organize information.

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<b>Core Standard 2:</b>	<b>2</b>	<b>Communication Skills:</b> Understands the concepts, strategies, and systems used to obtain and convey ideas and information.
Performance Indicator	2.4.3	Select and use appropriate graphic aids.
Performance Element	2.5	<i>Write internal and external business correspondence to convey and obtain information effectively.</i>
Performance Indicator	2.5.1	Explain the nature of effective written communications.
Performance Indicator	2.5.2	Select and utilize appropriate formats for professional writing.
Performance Indicator	2.5.3	Edit and revise written work consistent with professional standards.
Performance Indicator	2.5.4	Write professional emails.
Performance Indicator	2.5.5	Write professional business letters.
Performance Indicator	2.5.6	Write professional informational messages.
Performance Indicator	2.5.7	Write professional inquiries.
Performance Element	2.6	<i>Demonstrate staff communication techniques and strategies to achieve workplace objectives.</i>
Performance Indicator	2.6.1	Describe staff communication techniques.
Performance Indicator	2.6.2	Apply techniques to communicate effectively in the workplace.
Performance Indicator	2.6.3	Demonstrative active participation in staff meetings.
Performance Indicator	2.6.4	Demonstrate group problem-solving techniques.
Performance Element	2.7	<i>Utilize a variety of social media outlets to communicate with a business's stakeholders.</i>
Performance Indicator	2.7.1	Describe the impact of a social media brand on the achievement of organizational objectives.
Performance Indicator	2.7.2	Demonstrate ability to develop messages appropriate for various types of social media.
Performance Indicator	2.7.3	Distinguish between using social media for business and personal purposes.

<b>Core Standard 3:</b>	<b>3</b>	<b>Customer Relations:</b> Understands the techniques and strategies used to foster positive, ongoing relationships with customers.
Performance Element	3.1	<i>Foster positive relationships with customers to enhance company image.</i>
Performance Indicator	3.1.1	Explain the nature of positive customer relations.
Performance Indicator	3.1.2	Demonstrate a customer-service mindset.
Performance Indicator	3.1.3	Demonstrate rapport with customers.
Performance Indicator	3.1.4	Reinforce service orientation through communication.
Performance Indicator	3.1.5	Respond to customer inquiries.
Performance Indicator	3.1.6	Demonstrate appropriate communication for working with diverse clients.

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<b>Core Standard 3:</b>		<b>3</b>	<b>Customer Relations:</b> Understands the techniques and strategies used to foster positive, ongoing relationships with customers.
Performance Indicator	3.1.7		Interpret business policies to customers/clients.
Performance Element	3.2		<i>Resolve conflicts with/for customers to encourage repeat business.</i>
Performance Indicator	3.2.1		Handle difficult customers.
Performance Indicator	3.2.2		Demonstrate strategies for handling customer/client complaints.
Performance Element	3.3		<i>Reinforce company's image to exhibit the company's brand promise.</i>
Performance Indicator	3.3.1		Identify company's brand promise.
Performance Indicator	3.3.2		Determine ways of reinforcing the company's image through employee performance.

<b>Core Standard 4:</b>		<b>4</b>	<b>Economics:</b> Understands the economic principles and concepts fundamental to business operations.
Performance Element	4.1		<i>Understand fundamental economic concepts to obtain a foundation for employment in business.</i>
Performance Indicator	4.1.1		Distinguish between economic goods and services.
Performance Indicator	4.1.2		Explain the concept of economic resources.
Performance Indicator	4.1.3		Describe the concepts of economics and economic activities.
Performance Indicator	4.1.4		Determine economic utilities created by business activities.
Performance Indicator	4.1.5		Explain the principles of supply and demand.
Performance Indicator	4.1.6		Describe the functions of prices in market.
Performance Element	4.2		<i>Understand the nature of business to show its contributions to society.</i>
Performance Indicator	4.2.1		Explain the role of business in society.
Performance Indicator	4.2.2		Describe types of business activities.
Performance Element	4.3		<i>Understand economic systems to be able to recognize the environments in which businesses function.</i>
Performance Indicator	4.3.1		Explain the types of economic systems.
Performance Indicator	4.3.2		Identify the impact of small business/entrepreneurship on market economies.
Performance Indicator	4.3.3		Explain the concept of private enterprise.
Performance Indicator	4.3.4		Identify factors affecting a business's profit.
Performance Indicator	4.3.5		Determine factors affecting business risk.

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<b>Core Standard 4:</b>	<b>4</b>	<b>Economics:</b> Understands the economic principles and concepts fundamental to business operations.
Performance Indicator	4.3.6	Explain the concept of competition.
Performance Element	4.4	<i>Acquire knowledge of the impact of government on business activities to make informed economic decisions.</i>
Performance Indicator	4.4.1	Determine the relationship between government and business.
Performance Element	4.5	<i>Analyze cost/profit relationships to guide business decision-making.</i>
Performance Indicator	4.5.1	Explain the concept of productivity

<b>Core Standard 5:</b>	<b>5</b>	<b>Emotional Intelligence:</b> Understands techniques, strategies, and systems used to foster self-understanding and enhance relationships with others.
Performance Element	5.1	<i>Foster self-understanding to recognize the impact of personal feelings on others.</i>
Performance Indicator	5.1.1	Describe the nature of emotional intelligence
Performance Indicator	5.1.2	Explain the concept of self-esteem.
Performance Indicator	5.1.3	Discuss personal biases and stereotypes and methods for overcoming them.
Performance Indicator	5.1.4	Assess personal strengths and weaknesses.
Performance Indicator	5.1.5	Assess personal behavior and values.
Performance Element	5.2	<i>Develop personal traits to foster career advancement.</i>
Performance Indicator	5.2.1	Identify desirable personality traits important to business.
Performance Indicator	5.2.2	Utilize techniques to build self-confidence.
Performance Indicator	5.2.3	Demonstrate interest and enthusiasm.
Performance Indicator	5.2.4	Demonstrate initiative.
Performance Element	5.3	<i>Apply ethics to demonstrate trustworthiness.</i>
Performance Indicator	5.3.1	Demonstrate honesty and integrity.
Performance Indicator	5.3.2	Demonstrate responsible behavior.
Performance Indicator	5.3.3	Demonstrate fairness.
Performance Indicator	5.3.4	Assess risks of personal decisions.
Performance Indicator	5.3.5	Demonstrate ethical work habits.
Performance Indicator	5.3.6	Take responsibility for decisions and actions.
Performance Indicator	5.3.7	Build trust in relationships.
Performance Indicator	5.3.8	Describe the nature of ethics.
Performance Indicator	5.3.9	Explain reasons for ethical dilemmas.

Core Standard 5:	5	<b>Emotional Intelligence:</b> Understands techniques, strategies, and systems used to foster self-understanding and enhance relationships with others.
Performance Indicator	5.3.10	Recognize and respond to ethical dilemmas.
Performance Indicator	5.3.11	Manage commitments in a timely manner.
Performance Indicator	5.3.12	Develop tolerance for ambiguity.
Performance Element	5.4	<i>Exhibit techniques to manage emotional reactions to people and situations.</i>
Performance Indicator	5.4.1	Exhibit a positive attitude.
Performance Indicator	5.4.2	Demonstrate self-control.
Performance Indicator	5.4.3	Explain the use of feedback for personal growth.
Performance Indicator	5.4.4	Adjust to change.
Performance Element	5.5	<i>Identify with others' feelings, needs, and concerns to enhance interpersonal relations.</i>
Performance Indicator	5.5.1	Respect the privacy of others.
Performance Indicator	5.5.2	Show empathy for others.
Performance Indicator	5.5.3	Maintain the confidentiality of others.
Performance Indicator	5.5.4	Exhibit cultural sensitivity.
Performance Element	5.6	<i>Use communication skills to foster open, honest communications.</i>
Performance Indicator	5.6.1	Explain the nature of effective communications.
Performance Element	5.7	<i>Manage stressful situations to minimize potential negative impact.</i>
Performance Indicator	5.7.1	Use appropriate assertiveness.
Performance Indicator	5.7.2	Use conflict-resolution skills.
Performance Indicator	5.7.3	Explain the nature of office politics.
Performance Indicator	5.7.4	Overcome problems and difficulties associated with office politics/turf wars.
Performance Element	5.8	<i>Implement teamwork techniques to accomplish goals.</i>
Performance Indicator	5.8.1	Participate as a team member.
Performance Element	5.9	<i>Demonstrate leadership skills to achieve workplace objectives.</i>
Performance Indicator	5.9.1	Explain the concept of leadership.
Performance Indicator	5.9.2	Explain the nature of ethical leadership.
Performance Indicator	5.9.3	Model ethical behavior.
Performance Indicator	5.9.4	Determine personal vision.
Performance Indicator	5.9.5	Inspire others.
Performance Indicator	5.9.6	Demonstrate adaptability.

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<b>Core Standard 5:</b>		<b>5</b>	<b>Emotional Intelligence:</b> Understands techniques, strategies, and systems used to foster self-understanding and enhance relationships with others.
Performance Indicator	5.9.7		Develop an achievement orientation.
Performance Indicator	5.9.8		Challenge the status quo.
Performance Indicator	5.9.9		Lead change.
Performance Indicator	5.9.10		Enlist others in working toward a shared vision.
Performance Indicator	5.9.11		Coach others.
Performance Element	5.10		<i>Manage internal and external business relationships to foster positive interactions.</i>
Performance Indicator	5.10.1		Treat others with dignity and respect.
Performance Indicator	5.10.2		Foster positive working relationships.
Performance Indicator	5.10.3		Consider conflicting viewpoints.

<b>Core Standard 6:</b>		<b>6</b>	<b>Entrepreneurship:</b> Understands the concepts, processes, and skills associated with identifying new ideas, opportunities, and methods and with creating or starting a new project or BUSINESS venture.
PERFORMANCE ELEMENT	6.1		<i>Describe fundamental entrepreneurship factors.</i>
Performance Indicator	6.1.1		Describe traits of successful entrepreneurs.
Performance Indicator	6.1.2		Identify opportunities for small business ownership.

<b>Core Standard 7:</b>		<b>7</b>	<b>Financial Analysis:</b> Understands tools, strategies, and systems used to maintain, monitor, control, and plan the use of financial resources.
Performance Element	7.1		<i>Understand the fundamental principles of money needed to make financial exchanges.</i>
Performance Indicator	7.1.1		Explain forms of financial exchange (cash, credit, debit, electronic funds transfer, etc.).
Performance Indicator	7.1.2		Identify types of currency (paper money, coins, banknotes, government bonds, treasury notes, etc.).
Performance Indicator	7.1.3		Describe functions of money (medium of exchange, unit of measure, store of value).
Performance Indicator	7.1.4		Describe sources of income (wages/salaries, interest, rent, dividends, transfer payments, etc.).
Performance Indicator	7.1.5		Explain the time value of money.
Performance Indicator	7.1.6		Explain the purposes and importance of credit.
Performance Indicator	7.1.7		Explain legal responsibilities associated with financial exchange.

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Core Standard 7:	7	Financial Analysis: Understands tools, strategies, and systems used to maintain, monitor, control, and plan the use of financial resources.
Performance Element	7.2	<i>Analyze financial needs and goals to determine financial requirements.</i>
Performance Indicator	7.2.1	Explain the need to save and invest.
Performance Indicator	7.2.2	Set financial goals.
Performance Indicator	7.2.3	Develop budgets for personal and business uses.
Performance Indicator	7.2.4	Determine personal net worth.
Performance Indicator	7.2.5	Interpret basic financial statements such as income statements and balance sheets.
Performance Element	7.3	<i>Manage personal finances to achieve financial goals.</i>
Performance Indicator	7.3.1	Explain the nature of tax liabilities.
Performance Indicator	7.3.2	Interpret a pay stub.
Performance Indicator	7.3.3	Prepare bank account documents (e.g., checks, deposit/withdrawal slips, endorsements, etc.).
Performance Indicator	7.3.4	Maintain financial records.
Performance Indicator	7.3.5	Read and reconcile bank statement.
Performance Indicator	7.3.6	Calculate the cost of credit.
Performance Indicator	7.3.7	Demonstrate the wise use of credit.
Performance Indicator	7.3.8	Demonstrate procedures to validate credit history.
Performance Indicator	7.3.9	Make responsible financial decisions.
Performance Indicator	7.3.10	Protect against identity theft.
Performance Indicator	7.3.11	Pay bills.
Performance Indicator	7.3.12	Control debt.
Performance Indicator	7.3.13	Prepare personal income tax forms.
Performance Indicator	7.3.14	Discuss the nature of retirement planning.
Performance Indicator	7.3.15	Explain the nature of estate planning.
Performance Element	7.4	<i>Understand the use of financial-services providers to aid in financial-goal achievement.</i>

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<b>Core Standard 7:</b>		<b>7</b>	<b>Financial Analysis:</b> Understands tools, strategies, and systems used to maintain, monitor, control, and plan the use of financial resources.
Performance Indicator	7.4.1		Describe types of financial-services providers.
Performance Indicator	7.4.2		Discuss considerations in selecting a financial-services provider.
Performance Element	7.5		<i>Use investment strategies to ensure financial well-being.</i>
Performance Indicator	7.5.1		Explain types of investments.
Performance Element	7.6		<i>Acquire a foundational knowledge of accounting to understand its nature and scope.</i>
Performance Indicator	7.6.1		Describe the need for financial information.
Performance Indicator	7.6.2		Explain the concept of accounting.
Performance Element	7.7		<i>Acquire a foundational knowledge of finance to understand its nature and scope.</i>
Performance Indicator	7.7.1		Explain the role of finance in business.
Performance Element	7.8		<i>Use risk management products to protect personal and business financial well-being.</i>
Performance Indicator	7.8.1		Analyze the use of insurance for risk management.

<b>Core Standard 8:</b>		<b>8</b>	<b>Human Resource Management:</b> Understands the tools, techniques, and systems that businesses use to plan, staff, lead, and organize human resources.
Performance Element	8.1		<i>Understand the role and function of human resources management to obtain a foundational knowledge of its nature and scope.</i>
Performance Indicator	8.1.1		Discuss the nature of human resources management.
Performance Element	8.2		<i>Manage staff growth and development to increase productivity and employee satisfaction.</i>
Performance Indicator	8.2.1		Orient new employees.

<b>Core Standard 9:</b>		<b>9</b>	<b>Information Management:</b> Understands tools, strategies, and systems needed to access, process, maintain, evaluate, and disseminate information to assist business decision-making.
Performance Element	9.1		<i>Use information literacy skills to increase workplace efficiency and effectiveness.</i>
Performance Indicator	9.1.1		Assess information needs.

Core Standard 9:	9	<b>Information Management:</b> Understands tools, strategies, and systems needed to access, process, maintain, evaluate, and disseminate information to assist business decision-making.
Performance Indicator	9.1.2	Obtain needed information efficiently.
Performance Indicator	9.1.3	Evaluate quality and source of information.
Performance Indicator	9.1.4	Draw conclusions based on information analysis.
Performance Indicator	9.1.5	Apply information to accomplish a task.
Performance Indicator	9.1.6	Store information for future use.
Performance Element	9.2	<i>Acquire a foundational knowledge of information management to understand its nature and scope.</i>
Performance Indicator	9.2.1	Discuss the nature of information management.
Performance Element	9.3	<i>Utilize information-technology tools to manage and perform work responsibilities.</i>
Performance Indicator	9.3.1	Identify ways that technology impacts business.
Performance Indicator	9.3.2	Explain the role of information systems.
Performance Indicator	9.3.3	Discuss principles of computer systems.
Performance Indicator	9.3.4	Use basic operating systems.
Performance Indicator	9.3.5	Describe the scope of the Internet.
Performance Indicator	9.3.6	Demonstrate basic e-mail functions.
Performance Indicator	9.3.7	Demonstrate personal information management/productivity applications.
Performance Indicator	9.3.8	Demonstrate basic web-search skills.
Performance Indicator	9.3.9	Demonstrate basic word processing skills.
Performance Indicator	9.3.10	Demonstrate basic presentation applications.
Performance Indicator	9.3.11	Demonstrate basic database applications.
Performance Indicator	9.3.12	Demonstrate basic spreadsheet applications.
Performance Indicator	9.3.13	Use an integrated business software application package.
Performance Indicator	9.3.14	Demonstrate collaborative/groupware applications.
Performance Indicator	9.3.15	Create a web page.
Performance Element	9.4	<i>Apply data mining methods to acquire pertinent information for business decision-making.</i>
Performance Indicator	9.4.1	Discuss the nature of data mining.

## State Standards – Iowa, 2019 Business, Finance, Marketing and Management

<b>Core Standard 10:</b>	<b>10</b>	<b>Marketing:</b> Understands the tools, techniques, and systems that businesses use to create exchanges and satisfy organizational objectives.
Performance Element	10.1	<i>Understand marketing's role and function in business to facilitate economic exchanges with customers.</i>
Performance Indicator	10.1.1	Explain marketing and its importance in a global economy.
Performance Indicator	10.1.2	Describe marketing functions and related activities.
Performance Indicator	10.1.3	Demonstrate socially responsible marketing practices.

<b>Core Standard 11:</b>	<b>11</b>	<b>Operations:</b> Apply the processes and systems needed to monitor, plan, and control the day-to-day activities required for continued business functioning.
Performance Element	11.1	<i>Understand operation's role and function in business to value its contribution to a company.</i>
Performance Indicator	11.1.1	Explain the nature of operations.
Performance Element	11.2	<i>Adhere to health and safety regulations to support a safe work environment.</i>
Performance Indicator	11.2.1	Describe health and safety regulations in business.
Performance Indicator	11.2.2	Demonstrate process to report noncompliance with business health and safety regulations.
Performance Element	11.3	<i>Implement safety procedures to minimize loss.</i>
Performance Indicator	11.3.1	Follow instructions for use of equipment, tools, and machinery.
Performance Indicator	11.3.2	Follow safety precautions.
Performance Indicator	11.3.3	Maintain a safe work environment.
Performance Indicator	11.3.4	Explain procedures for handling accidents.
Performance Indicator	11.3.5	Handle and report emergency situation.
Performance Element	11.4	<i>Implement security policies/procedures to minimize chance for loss.</i>
Performance Indicator	11.4.1	Explain routine security precautions.
Performance Indicator	11.4.2	Follow established security procedures/policies.
Performance Indicator	11.4.3	Protect company information and intangibles.
Performance Element	11.5	<i>Utilize project-management skills to improve workflow and minimize costs.</i>
Performance Indicator	11.5.1	Plan project.
Performance Indicator	11.5.2	Monitor projects and take corrective actions.
Performance Indicator	11.5.3	Evaluate project success.
Performance Element	11.6	<i>Implement purchasing activities to obtain business supplies, equipment, resources, and services.</i>

## State Standards – Iowa, 2019 Business, Finance, Marketing and Management

<b>Core Standard 11:</b>		<b>11</b>	<b>Operations:</b> Apply the processes and systems needed to monitor, plan, and control the day-to-day activities required for continued business functioning.
Performance Indicator	11.6.1		Explain the nature and scope of purchasing.
Performance Indicator	11.6.2		Place orders/reorders.
Performance Indicator	11.6.3		Maintain inventory of supplies.
Performance Element	11.7		<i>Understand production's role and function in business to recognize its need in an organization.</i>
Performance Indicator	11.7.1		Explain the concept of production.
Performance Element	11.8		<i>Maintain property and equipment to facilitate ongoing business activities.</i>
Performance Indicator	11.8.1		Comply with policies and procedures for use of property and equipment.
Performance Element	11.9		<i>Comply with security rules, regulations, and codes (e.g., property, privacy, access, confidentiality) to protect customer and company information, reputation, and image.</i>
Performance Indicator	11.9.1		Explain information privacy, security, and confidentiality considerations in business.
Performance Indicator	11.9.2		Maintain data security.
Performance Element	11.10		<i>Understand supply chain management role to recognize its need in business.</i>
Performance Indicator	11.10.1		Explain the concept of supply chain.

<b>Core Standard 12:</b>		<b>12</b>	<b>Professional Development:</b> Understands concepts, tools, and strategies used to explore, obtain, and develop in a business career.
Performance Element	12.1		<i>Acquire self-development skills to enhance relationships and improve efficiency in the work environment.</i>
Performance Indicator	12.1.1		Maintain appropriate personal appearance.
Performance Indicator	12.1.2		Demonstrate systematic behavior.
Performance Indicator	12.1.3		Set personal goals.
Performance Element	12.2		<i>Utilize critical-thinking skills to determine best options/outcomes.</i>
Performance Indicator	12.2.1		Explain the need for innovation skills.
Performance Indicator	12.2.2		Make decisions.
Performance Indicator	12.2.3		Demonstrate problem-solving skills.
Performance Element	12.3		<i>Participate in career planning to enhance job-success potential.</i>
Performance Indicator	12.3.1		Assess personal interests and skills needed for success in business.
Performance Indicator	12.3.2		Analyze employer expectations in the business environment.

## State Standards – Iowa, 2019 Business, Finance, Marketing and Management

<b>Core Standard 12:</b>	<b>12</b>	<b>Professional Development:</b> Understands concepts, tools, and strategies used to explore, obtain, and develop in a business career.
Performance Indicator	12.3.3	Explain the rights of workers.
Performance Indicator	12.3.4	Identify sources of career information.
Performance Indicator	12.3.5	Identify tentative occupational interest.
Performance Indicator	12.3.6	Explain employment opportunities in business.
Performance Indicator	12.3.7	Explain career opportunities in entrepreneurship.
Performance Element	12.4	<i>Implement job-seeking skills to obtain employment.</i>
Performance Indicator	12.4.1	Utilize job-search strategies.
Performance Indicator	12.4.2	Complete a job application.
Performance Indicator	12.4.3	Interview for a job.
Performance Indicator	12.4.4	Write a follow-up letter after job interviews.
Performance Indicator	12.4.5	Write a letter of application.
Performance Indicator	12.4.6	Prepare a résumé.
Performance Element	12.5	<i>Utilize career-advancement activities to enhance professional development.</i>
Performance Indicator	12.5.1	Describe techniques for obtaining work experience (e.g., volunteer activities, internships).
Performance Indicator	12.5.2	Explain the need for ongoing education as a worker.
Performance Indicator	12.5.3	Explain possible advancement patterns for jobs.
Performance Element	12.6	<i>Understand and follow company rules and regulations to maintain employment.</i>
Performance Indicator	12.6.1	Adhere to company protocols and policies.
Performance Indicator	12.6.2	Follow rules of conduct.
Performance Indicator	12.6.3	Follow chain of command.

<b>Core Standard 13:</b>	<b>13</b>	<b>Strategic Management:</b> Understands tools, techniques, and systems that affect a business's ability to plan, control, and organize an organization/department.
Performance Element	13.1	<i>Recognize management's role to understand its contribution to business success.</i>
Performance Indicator	13.1.1	Explain the concept of management.

For additional information: <https://www.mbaresearch.org/index.php/curriculum-teaching>

<b>Health Science Foundational Standards</b>	
<b>1.0</b>	<b>Academic Foundation: Healthcare professionals will know the academic subject matter required for proficiency within their area. They will use this knowledge as needed in their role. The following accountability criteria are considered essential for students in a health science program of study.</b>
1.1	Human Structure and Function
1.1.1	Classify the basic structural and functional organization of the human body (tissue, organ, and system).
1.1.2	Recognize body planes, directional terms, quadrants, and cavities.
1.1.3	Analyze the basic structure and function of the human body.
1.1.4	Demonstrate anatomical position.
1.2	Diseases and Disorders
1.2.1	Describe common diseases and disorders of each body system (prevention, pathology, diagnosis, and treatment).
1.2.2	Recognize emerging diseases and disorders.
1.2.3	Investigate biomedical therapies as they relate to the prevention, pathology, and treatment of disease.
1.3	Medical Mathematics
1.3.1	Apply mathematical computations related to healthcare procedures (metric and household, conversions and measurements).
1.3.2	Analyze diagrams, charts, graphs, and tables to interpret healthcare results.
1.3.3	Record time using the 24-hour clock.
<b>2.0</b>	<b>Communications: Healthcare professionals will know the various methods of giving and obtaining information. They will communicate effectively, both orally and in writing.</b>
2.1	Concepts of Effective Communication
2.1.1	Interpret verbal and nonverbal communication.
2.1.2	Recognize barriers to communication.
2.1.3	Report subjective and objective information.
2.1.4	Recognize the elements of communication using a sender-receiver model.
2.1.5	Apply speaking and active listening skills.
2.1.6	Distinguish professional communications style from conversational or informal communications style.
2.1.7	Describe appropriate interactions with patients throughout various stages of psychosocial Development.
2.2	Medical Terminology
2.2.1	Use standardized roots, prefixes, and suffixes for healthcare related communications.
2.2.2	Use standardized medical abbreviations, when appropriate, to communicate information.
2.3	Written Communication Skills
2.3.1	Recognize elements of written and electronic communication (spelling, grammar, and formatting).
2.3.2	Demonstrate appropriate use of digital communication in a work environment, such as email, text, and social media.

<b>Health Science Foundational Standards</b>	
<b>3.0</b>	<b>Systems: Healthcare professionals will understand how their role fits into their department, their organization and the overall healthcare environment. They will identify how key systems affect services they perform and quality of care.</b>
3.1	Healthcare Delivery Systems
3.1.1	Understand the healthcare delivery system (public, private, government, and non-profit, specialty medical and dental practices).
3.1.2	Explain the factors influencing healthcare delivery systems.
3.1.3	Explore the roles and responsibilities of provider and support personnel in healthcare delivery systems.
3.1.4	Describe the rights and responsibilities of consumers within the healthcare system.
3.1.5	Explain the impact of emerging issues such as technology, epidemiology, bioethics, and socioeconomics on healthcare delivery systems.
3.1.6	Discuss healthcare payment sources and the impact of under-insured and uninsured on healthcare finances.
3.1.7	Explain the history and role of health insurance and employer/employee benefits.
3.1.7	Explain fundamental terms related to health insurance (claim, coinsurance, fraud, HIPAA, premium).
<b>4.0</b>	<b>Employability Skills: Healthcare professionals will understand how employability skills enhance their employment opportunities and job satisfaction. They will demonstrate key employability skills and will maintain and upgrade skills, as needed.</b>
4.1	Personal Traits of the Healthcare Professional
4.1.1	Classify the personal traits and attitudes desirable in a member of the healthcare team.
4.1.2	Summarize professional standards as they apply to hygiene, dress, language, confidentiality and behavior.
4.2	Employability Skills
4.2.1	Investigate transferable or employability skills to determine those essential in healthcare Settings.
4.2.2	Demonstrate key transferable or employability skills in healthcare settings.
4.3	Career Decision-Making
4.3.1	Discuss levels of education, credentialing requirements, and employment trends in Healthcare.
4.3.2	Compare careers within the health science career pathways (diagnostic services, therapeutic services, health informatics, support services, or biotechnology research and development).
4.4	Employability Preparation
4.4.1	Develop components of a personal portfolio.
4.4.2	Demonstrate the process for obtaining employment.
<b>5.0</b>	<b>Legal Responsibilities: Healthcare professionals will understand the legal responsibilities, limitations, and implications of their actions within the healthcare delivery setting. They will perform their duties according to regulations, policies, laws and legislated rights of clients.</b>

<b>Health Science Foundational Standards</b>	
5.1	Legal Implications
5.1.1	Analyze legal responsibilities.
5.1.2	Apply procedures for accurate documentation and record keeping.
5.2	Legal Practices
5.2.1	Apply Health Insurance Portability and Accountability Act (HIPAA) standards for privacy and security of healthcare information.
5.2.2	Describe advance directives.
5.2.3	Summarize the Patient’s Bill of Rights.
5.2.4	Understand informed consent.
5.2.5	Explain laws governing harassment, labor management, scope of practice, negligence and malpractice.
<b>6.0</b>	<b>Ethics: Healthcare professionals will understand accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment. They will perform quality healthcare delivery.</b>
6.1	Ethical Boundaries
6.1.1	Differentiate between ethical and legal issues impacting healthcare.
6.1.2	Recognize ethical issues and their implications related to healthcare.
6.2	Ethical Practice
6.2.1	Apply procedures for reporting activities and behaviors that affect the health, safety, and welfare of others.
6.2.2	Apply principles of ethical behavior to healthcare situations.
6.3	Cultural, Social, and Ethnic Diversity
6.3.1	Understand religious and cultural values as they impact healthcare.
6.3.2	Demonstrate respectful, empathetic, patient-centered treatment of ALL patients/clients.
<b>7.0</b>	<b>Safety Practices: Healthcare professionals will understand the existing and potential hazards to clients, co-workers, and self. They will prevent injury or illness through safe work practices and follow health and safety policies and procedures.</b>
7.1	Infection Control
7.1.1	Explain principles of infection control.
7.1.2	Describe methods of controlling the spread and growth of microorganisms.
7.2	Personal Safety
7.2.1	Apply personal safety procedures based on Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations.
7.2.2	Apply principles of body mechanics.
7.2.3	Demonstrate and apply the use of personal protective equipment (PPE).
7.3	Environmental Safety
7.3.1	Apply safety techniques in the work environment.
7.4	Common Safety Hazards
7.4.1	Comply with safety signs, symbols, and labels.
7.4.2	Understand implications of hazardous materials.

<b>Health Science Foundational Standards</b>	
7.5	Emergency Procedures and Protocols
7.5.1	Practice fire safety in a healthcare setting.
7.5.2	Apply principles of basic emergency response in natural disasters and other emergencies.
<b>8.0</b>	<b>Teamwork: Healthcare professionals will understand the roles and responsibilities of individual members as part of the healthcare team, including their ability to promote the delivery of quality healthcare. They will interact effectively and sensitively with all members of the healthcare team.</b>
8.1	Healthcare Teams
8.1.1	Understand roles and responsibilities of team members.
8.1.2	Identify characteristics of effective teams and team members in various roles.
8.2	Team Member Participation
8.2.1	Recognize methods for building positive team relationships.
8.2.2	Analyze attributes and attitudes of effective team leaders and team members.
8.2.3	Apply effective techniques for managing team conflict.
8.2.4	Evaluate why teamwork is an important part of healthcare and how it improves patient Care.
<b>9.0</b>	<b>Health Maintenance Practices: Healthcare professionals will understand the fundamentals of wellness and the prevention of disease processes. They will practice preventive health behaviors among the clients.</b>
9.1	Healthy Behaviors
9.1.1	Apply behaviors that promote health and wellness.
9.1.2	Describe strategies for the prevention of diseases including health screenings and Examinations.
9.1.3	Discuss complementary (alternative) health practices as they relate to wellness and disease prevention.
9.1.4	Examine aspects of behavioral health (anxiety, depression, substance abuse, suicide).
9.2	Healthcare Across the Lifespan
9.2.1	Discuss impact of physical, mental, social and behavioral development across the lifespan on healthcare.
<b>10.0</b>	<b>Technical Skills: Healthcare professionals will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.</b>
10.1	Technical Skills
10.1.1	Apply procedures for measuring and recording vital signs including the normal ranges.
10.1.2	Apply skills to obtain training or certification in cardiopulmonary resuscitation (CPR), automated external defibrillator (AED), foreign body airway obstruction (FBAO) and first Aid.
<b>11.0</b>	<b>Information Technology Applications: Healthcare professionals will use information technology applications required within all career specialties. They will demonstrate use as appropriate to healthcare applications.</b>
11.1	Health Information Literacy and Skills
11.1.1	Identify methods and types of data collected in healthcare.

<b>Health Science Foundational Standards</b>	
11.1.2	Use health record data collection tools (such as input screens, document templates).
11.1.3	Differentiate between types and content of health records (patient, pharmacy, and laboratory).
11.1.4	Ensure that documentation in the health record reflects timeliness, completeness, and accuracy.
11.1.5	Adhere to information systems policies and procedures as required by national, state, local, and organizational levels.
<b>11.2</b>	<b>Privacy and Confidentiality of Health Information</b>
11.2.1	Apply the fundamentals of privacy and confidentiality policies and procedures.
11.2.2	Identify legal and regulatory requirements related to the use of personal health Information.
11.2.3	Identify and apply policies and procedures for access and disclosure of personal health Information.
11.2.4	Describe the consequences of inappropriate use of health data in terms of disciplinary Action.
11.2.5	Describe appropriate methods to correct inaccurate information/errors personally entered into an electronic health record (HER).
<b>11.3</b>	<b>Basic Computer Literacy Skills</b>
11.3.1	Apply basic computer concepts and terminology in order to use computers and other mobile devices.
11.3.2	Demonstrate basic computer operating procedures.
11.3.3	Demonstrate use of file organization and information storage.
11.3.4	Use basic word processing, spreadsheet, and database applications.
11.3.5	Evaluate the validity of web-based resources.
11.3.6	Demonstrate use of appropriate email and social media usage.

<b>Therapeutic Services</b>	
<b>TS-1.0</b>	<b>Client Interaction: Therapeutic services professionals will be able to explain planned procedures and goals to patients and other clients. They will use various strategies to respond to questions and concerns of patients and other clients.</b>
TS-1.1	Oral Communication
TS-1.1.1	Evaluate patient or other client’s ability to understand information given.
TS-1.1.2	Demonstrate empathy for patients and other clients.
TS-1.1.3	Choose jargon-free language appropriate to the situation.
TS-1.1.4	Adjust communication to the needs of the patient or other clients.
<b>TS-2.0</b>	<b>Intra Team Communication: Therapeutic services professionals will be able to communicate patient and other client information within a team.</b>
TS-2.1	Team Interactions
TS-2.1.1	Distinguish appropriate role and responsibilities of each team member.
TS-2.1.2	Respect and value the expertise and contributions of all team members.
TS-2.1.3	Evaluate relevancy of information to be conveyed.
TS-2.1.4	Formulate and report information in a way that is clear and concise.
<b>TS-3.0</b>	<b>Information Collection: Therapeutic services professionals will understand the facility protocol and regulatory guidelines for collecting patient and other client information. They will participate in identifying and responding to patient and other client health care needs, strengths, problems and report results.</b>
TS-3.1	Information Collection
TS-3.1.1	Select appropriate tools for information to be collected.
TS-3.1.2	Collect and format information using facility protocols and regulatory guidelines.
<b>TS-4.0</b>	<b>Treatment Planning and Implementation: Therapeutic services professionals will understand the general purpose and components of the treatment plan. They will collaborate in planning procedures according to facility protocol and regulatory guidelines. They will understand how these procedures support the goals and objectives of the treatment plan of the patient or other client and implement the procedures within their scope of practice.</b>
TS-4.1	Planning
TS-4.1.1	Design the treatment plan incorporating patient or other client input.
TS-4.1.2	Create a treatment plan using a problem-solving model and evaluate for intervention opportunities.
TS-4.1.3	Select appropriate resources to implement treatment plan.
TS-4.2	Implementation
TS-4.2.1	Evaluate priorities in order to organize work.
TS-4.2.2	Use equipment and instruments according to the manufacturer’s guidelines and accepted safety practice.
TS-4.2.3	Document actions according to facility protocol and regulatory guidelines.
<b>TS-5.0</b>	<b>Monitoring Client Status: Therapeutic services professionals will understand the process for monitoring patient and other client health status. They will assess health status and report the results to a treatment team.</b>

TS-5.1	Procedures for Monitoring
TS-5.1.1	Evaluate patient and client response to administered treatments and procedures.
TS-5.1.2	Analyze and report patient and other client response.
TS-5.1.3	Assess need for follow up and alternative care.
<b>TS-6.0</b>	<b>Patient and other Client Status Evaluation: Therapeutic services professionals will evaluate patient and other client needs, strengths and problems in order to determine if treatment goals are being reached.</b>
TS-6.1	Evaluation
TS-6.1.1	Choose appropriate evaluation tools to assess patient and other client response to treatment plan.
TS-6.1.2	Analyze information gathered.
TS-6.1.3	Revise or create modifications to treatment plan based on information gathered.

<b>Health Informatics</b>	
<b>HI-1.0</b>	<b>Communication: Health informatics professionals will understand the need to communicate health/medical information accurately and within legal/regulatory bounds across the organization.</b>
HI-1.1	Communication
HI-1.1.1	Manage the accuracy, effectiveness, and timeliness of the transfer of information.
HI-1.1.2	Evaluate legal and regulatory requirements for the transfer of information.
HI-1.1.3	Distinguish who in the organization needs information and when they need it.
<b>HI-2.0</b>	<b>Analysis: Health informatics professionals will know the quantitative and qualitative requirements for information. They will analyze the information for designated purposes.</b>
HI-2.1	Analysis
HI-2.1.1	Synthesize information to determine the best course of action.
HI-2.1.2	Assess health information required by patients, staff, and the community.
HI-2.1.3	Assemble all necessary data components for successful completion of tasks.
HI-2.1.4	Appraise the accuracy and completeness of data.
HI-2.1.5	Assess whether information is reported and disseminated within legal and regulatory bounds.
<b>HI-3.0</b>	<b>Abstracting and Coding: Health informatics professionals will know how to read and interpret a medical record or other medical documents, applying knowledge of medical terminology and codes. They will extract required information from a medical record and other medical documents for a variety of purposes, upon regulatory or legal request.</b>
HI-3.1	Abstracting and Coding
HI-3.1.1	Assemble appropriate, accurate information to record charges and reimbursement.
HI-3.1.2	Choose accurate medical terminology.
HI-3.1.3	Assess and apply information for regulatory and legal purposes.
<b>HI-4.0</b>	<b>Information Systems: Health informatics professionals will understand the resources, routes and flow of information within the health care system. They will participate in the design and implementation of effective systems or processes.</b>
HI-4.1	Information Systems
HI-4.1.1	Synthesize the information systems utilized by the organization.
HI-4.1.2	Assess how systems interact to facilitate the timely and accurate flow.
HI-4.1.3	Organize information within the parameters of the information systems.
HI-4.1.4	Integrate information for timely, accurate dissemination.
HI-4.1.5	Evaluate effectiveness of systems.
HI-4.1.6	Assess and recommend systems for improvement.
<b>HI-5.0</b>	<b>Documentation: Health informatics professionals will understand the content and diverse uses of health information. They will accurately document and communicate appropriate information using legal and regulatory processes.</b>
HI-5.1	Documentation
HI-5.1.1	Assemble and accurately document required information.

<b>Health Informatics</b>	
HI-5.1.2	Interpret information that has been collected.
HI-5.1.3	Differentiate the various purposes and audiences for whom the information is collected.
HI-5.1.4	Prepare accurate documentation for various audiences within legal and regulatory requirements.
HI-5.1.5	Disseminate information to various audiences using established systems and guidelines.
HI-5.1.6	Assess and recommend processes for improvement.
<b>HI-6.0</b>	<b>Operations: Health informatics professionals will understand the broad scope of operations in which health care services are delivered. They will know the systems operations used to capture, retrieve, and maintain information from internal and external sources. They will utilize internal and external information and resources accurately and efficiently.</b>
HI-6.1	Operations
HI-6.1.1	Analyzing the internal and external sources of information and resources available.
HI-6.1.2	Project outcomes as interconnected components of a modified health care system.
HI-6.1.3	Select the systems and sources of information necessary for the successful completion of the task.
HI-6.1.4	Participate in the design of operational systems and processes.
HI-6.1.5	Evaluate operational systems and processes for improvement.

<b>Support Services</b>	
<b>SS-1.0</b>	<b>Operations: Support services professionals will examine, differentiate, and enhance the responsibilities of their roles. They will perform their tasks safely following established internal and external guidelines.</b>
SS-1.1	Administration
SS-1.1.1	Develop/implement departmental mission statement, goals, objectives, and strategic plan.
SS-1.1.2	Develop/implement departmental policies, procedures, processes and modify as needed.
SS-1.1.3	Coordinate departmental activities with other departments, outside agencies and contractors, including event planning and logistics.
SS-1.1.4	Develop/implement new and existing services.
SS-1.1.5	Design and implement an employee recognition program.
SS-1.2	Quality Measurement and Improvement
SS-1.2.1	Monitor customer expectations through satisfaction plans and measurement tools to assure adequacy of products and services.
SS-1.2.2	Participate and provide support standardization, consolidation and/or re-engineering processes.
SS-1.2.3	Evaluate cost effectiveness of alternative methodologies.
SS-1.2.4	Perform quality management activities.
SS-1.2.5	Monitor customer expectations through satisfaction plans and measurement tools to assure adequacy of service.
SS-1.3	Compliance
SS-1.3.1	Adhere to a code of ethics to ensure corporate compliance.
SS-1.3.2	Ensure compliance with legal, regulatory, and accreditation standards or codes. Administer the hazardous materials management program.
SS-1.3.3	Coordinate with physicians, departmental directors/managers, and outside agencies in the development of Emergency Preparedness Plans.
SS-1.3.4	Inspect buildings/facilities and grounds to ensure compliance with standards, regulations, and codes.
SS-1.3.5	Check work of staff to ensure compliance with applicable safety and building regulations.
<b>SS-2.0</b>	<b>Aseptic Procedures: Support services professionals will adopt work practices that maintain a clean and healthy environment. They will demonstrate best practices to reduce or eliminate pathogenic organisms.</b>
SS-2.1	Cleaning and Decontamination
SS-2.1.1	Demonstrate various decontamination techniques and procedures.
SS-2.1.2	Demonstrate knowledge of standards precaution guidelines.
SS-2.1.3	Select procedures and precautions to be followed when using chemicals.
SS-2.1.4	Demonstrate techniques for mechanical and manual cleaning procedures.
SS-2.1.5	Evaluate potential causes and methods of transmitting infection (e.g., contact, airborne, common vehicle, vector-borne).
SS-2.1.6	Integrate all infection control standards with design and construction activities.
SS-2.2	Hazardous Materials and Waste Management

<b>Support Services</b>	
SS-2.2.1	Develop, implement, and monitor hazardous waste disposal policies and procedures in accordance with regulatory requirements.
SS-2.2.2	Assess and monitor the operations of a waste management program, including recycling and reduction of regulated medical, solid, hazardous chemical and radioactive waste materials.
SS-2.2.3	Develop systems and procedures that minimize customer cost of ordering, storing, and using supplies, services, and equipment.
SS-2.2.4	Ensure that regulated waste is handled, packaged, stored and disposed of in accordance with federal, state, and local regulations and maintain appropriate documentation.
SS-2.3	<b>Materials Handling and Storage</b>
SS-2.3.1	Demonstrate process and environmental requirements for proper handling and storage of sterile and non-sterile items.
SS-2.3.2	Demonstrate appropriate inventory control and distribution systems.
SS-2.3.3	Describe and implement a program to purchase materials, supplies, and capital equipment within allocated resources.
SS-2.3.4	Apply optimal material flow and layout.
SS-2.3.5	Adopt policies and procedures to monitor distribution, consumption, and pilferage or materials.
SS-2.3.6	Provide adequate space to meet standards for storage.
<b>SS-3.0</b>	<b>Resource Management: Support services professionals will evaluate the principles and techniques of resource management. They will make appropriate decisions to maximize the use of available resources.</b>
SS-3.1	<b>Finance</b>
SS-3.1.1	Participate and evaluate purchasing processes and agreements.
SS-3.1.2	Evaluate audit activities, including the review of discrepancies, purchase orders, and invoices.
SS-3.1.3	Assess cost benefits that support best product recommendations.
SS-3.1.4	Explain competitive pricing, terms, and service levels.
SS-3.1.5	Identify opportunities for reduction in resource consumption.
SS-3.1.6	Develop inventory reduction targets and process to achieve targets.
SS-3.2	<b>Acquisition and Distribution</b>
SS-3.2.1	Implement purchasing and procurement techniques that improve the overall supply chain.
SS-3.2.2	Analyze timely order placement, supplier performance, and continuously review for effectiveness.
SS-3.2.3	Assess a supplier performance standards program.
SS-3.2.5	Provide consultation to departments requiring assistance in resource allocation.
SS-3.2.6	Assess the integration of resource functions.
SS-3.2.7	Implement appropriate distribution strategies and systems to ensure optimal materials flow.
SS-3.2.8	Organize adequate quantities of supplies, equipment, instruments and medical devices are maintained.

<b>Support Services</b>	
SS-3.3	Equipment and Maintenance
SS-3.3.1	Participate in capital purchasing processes.
SS-3.3.2	Assess procedures and processes for the selection, acquisition, distribution, and maintenance of equipment.
SS-3.3.3	Apply written instructions for the equipment manufactures operations manual, departmental policies and procedures.
SS-3.3.4	Implement a preventive maintenance (PM) process for buildings, equipment, parts, supplies, and utilities as appropriate.
SS-3.3.5	Implement a preventive maintenance (PM) process for buildings, equipment, parts, supplies, and utilities as appropriate.
SS-3.3.6	Participate in equipment and systems training programs for maintenance staff and user groups.
SS-3.4	Staffing and Productivity
SS-3.4.1	Participate in a comprehensive training and education program, covering such aspects as safety, infection control, hazardous materials, and new equipment use.
SS-3.4.2	Analyze labor distribution for projects and operations.
SS-3.4.3	Adopt reporting mechanisms for departmental functions.
<b>SS-4.0</b>	<b>Aesthetics: Support services professionals will defend the establishment, maintenance, and improvement of the environment. They will assist in the development and implementation of facility standards.</b>
SS-4.1	Physical Environment and Presentation
SS-4.1.1	Coordinate with other departments to select facility finishes and furnishings within appropriate safety codes.
SS-4.1.2	Participate in the development of design and construction plans.
SS-4.1.3	Analyze the therapeutic and functional aspects of color décor and furnishing.
SS-4.1.4	Provide facility accessibility through appropriate way finding and maintaining a clutter free environment.
SS-4.1.5	Maintain facility in good repair.
SS-4.1.6	Organize, deliver and present products and services in a quality manner.

For additional information: <https://www.healthscienceconsortium.org/standards>

<b>HS/FCS Foundational Standards</b>	
<b>1.0 Comprehensive Standard</b>	
Integrate knowledge, skills, and practices needed for a career in the human services cluster (family and human services, hospitality and tourism, education and training, housing and apparel).	
1.1	Content Standard Analyze career paths within human service industries.
	Competencies
1.1.1	Explain roles and functions of individuals engaged in human service careers.
1.1.2	Analyze opportunities for employment and entrepreneurial endeavors.
1.1.3	Summarize education and training requirements and opportunities for career paths.
1.1.4	Analyze the impact of the industry on local, state, national, and global economies.
1.1.5	Create an employment portfolio to communicate skills needed for careers in human services.
1.1.6	Analyze the role of professional organizations and credentials in human service professions.
<b>2.0 Comprehensive Standard</b>	
Integrate multiple life roles and responsibilities in family, work, and community settings.	
2.1	Content Standard Analyze strategies to manage multiple roles and responsibilities (individual, family, career, community, and global).
	Competencies
2.1.1.	Summarize local and global policies, issues, and trends in workplace, community, and family dynamics that affect individuals and families.
2.1.2	Analyze potential effects of various career path decisions on balancing work and family.
2.1.3	Develop a life plan, including pathways to acquiring the knowledge and skills needed to achieve individual, family, and career goals.
2.2	Content Standard Demonstrate transferable knowledge, attitudes, and technical and employability skills in school, community and workplace settings.
	Competencies
2.2.1	Analyze potential career choices to determine the knowledge, skills, attitudes, and opportunities associated with each career.
2.2.2	Demonstrate job seeking and job keeping skills.
2.2.3	Apply communication skills in school, community and workplace settings and with diverse populations.
2.2.4	Demonstrate collaborative skills in school, community and workplace settings and with diverse populations.
2.2.5	Demonstrate leadership skills and abilities in school, workplace and community settings.
2.2.6	Demonstrate employability skills, work ethics, and professionalism.
2.3	Content Standard Evaluate the reciprocal effects of individual and family participation in community and civic activities.
	Competencies

<b>HS/FCS Foundational Standards</b>	
2.3.1	Demonstrate skills that individuals and families can utilize to support civic engagement in community activities.
2.3.2	Analyze personal and family assets and skills that provide service to the community.
2.3.3.	Analyze community resources and systems of formal and informal support available to individuals and families.
2.3.4	Identify ways individuals and families can influence change in policies, agencies, and institutions that affect individuals and families.
<b>3.0</b>	<b>Comprehensive Standard</b> Demonstrate respectful and caring relationships in the family, workplace and community.
3.1	Content Standard Analyze functions and expectations of various types of relationships.
	Competencies
3.1.1	Analyze processes for building and maintaining interpersonal relationships.
3.1.2	Predict the effects of various stages of the family life cycle on interpersonal relationships.
3.1.3	Compare physical, emotional, spiritual and intellectual functioning in stable and unstable relationships.
3.1.4	Analyze factors that contribute to healthy and unhealthy relationships.
3.1.5	Analyze processes for handling unhealthy relationships.
3.1.6	Demonstrate stress management strategies for family, work, and community settings.
3.2	Content Standard Analyze personal needs and characteristics and their effects on interpersonal relationships.
	Competencies
3.2.1	Analyze the effects of personal characteristics on relationships.
3.2.2	Analyze the effect of personal need on relationships.
3.2.3	Analyze the effects of self-esteem and self-image on relationships.
3.2.4	Analyze the effects of life span events and conditions on relationships.
3.2.5	Explain the effects of personal standards and behaviors on interpersonal relationships.
3.3	Content Standard Demonstrate communication skills that contribute to positive relationships.
	Competencies
3.3.1	Analyze communication styles and their effects on relationships.
3.3.2	Demonstrate verbal and nonverbal behaviors and attitudes that contribute to effective communication.
3.3.3	Demonstrate effective listening and feedback techniques.
3.3.4	Analyze strategies to overcome communication barriers in family, community and work settings.
3.3.5	Apply ethical principles of communication in family, community and work settings.
3.3.6	Analyze the effects of technology on communications in family, work, and community settings.
3.3.7	Analyze the roles and functions of communications in family, work, and community settings.

<b>HS/FCS Foundational Standards</b>	
3.4	Content Standard Evaluate effective conflict prevention and management techniques.
	Competencies
3.4.1	Analyze the origin and development of attitudes and behaviors regarding conflict.
3.4.2	Explain how similarities and differences among people affect conflict prevention and management.
3.4.3	Apply the roles of decision making and problem solving in reducing and managing conflict.
3.4.4	Demonstrate nonviolent strategies that address conflict.
3.4.5	Demonstrate effective responses to harassment.
3.4.6	Assess community resources that support conflict prevention and management.
3.5	Content Standard Demonstrate teamwork and leadership skills in the family, workplace, and community.
	Competencies
3.5.1	Create an environment that encourages and respects the ideas, perspectives, and contributions of all group members.
3.5.2	Demonstrate strategies to motivate, encourage, and build trust in group members.
3.5.3	Demonstrate strategies that utilize the strengths and minimize the limitations of team members.
3.5.4	Demonstrate techniques that develop team and community spirit.
3.5.5	Demonstrate ways to organize and delegate responsibilities.
3.5.6	Create strategies to integrate new team members.
3.5.7	Demonstrate processes for cooperating, compromising, and collaborating.
3.6	Content Standard Demonstrate standards that guide behavior in interpersonal relationships.
	Competencies
3.6.1	Apply ethical guidelines when assessing interpersonal issues and situations.
3.6.2	Apply critical thinking and ethical standards when making judgments and taking action.
3.6.3	Demonstrate ethical behavior in family, workplace, and community settings.
3.6.4	Compare and contrast points of view regarding current ethical issues.
<b>4.0</b>	<b>Comprehensive Standard</b> Analyze factors that influence human growth and development.
4.1	Content Standard Analyze principles of human growth and development across the life span.
	Competencies
4.1.1	Analyze physical, emotional, social, moral, and cognitive development.
4.1.2	Analyze interrelationships among physical, emotional, social, moral, and cognitive aspects of human growth and development.
4.1.3	Analyze current and emerging research about human growth and development, including but not limited to brain development research.
4.2	Content Standard Analyze conditions that influence human growth and development.
	Competencies
4.2.1	Analyze the influences of heredity and environment on human growth and development.

<b>HS/FCS Foundational Standards</b>	
4.2.2	Analyze the influences of social, economic, and technological forces on individual growth and development.
4.2.3	Analyze the influences of gender, ethnicity, and culture on individual development.
4.2.4	Analyze the influences of life events on individuals' physical, emotional, social, moral and cognitive development.
4.2.5	Analyze geographic, demographic, political, and global influences on human growth and development.
<b>4.3</b>	<b>Content Standard</b> Analyze strategies that promote growth and development across the life span.
	Competencies
4.3.1	Analyze the role of nurturance on human growth and development.
4.3.2	Analyze the role of communication on human growth and development.
4.3.3	Analyze the role of education and family and social services support systems and resources in meeting human growth and development needs.
<b>5.0</b>	<b>Comprehensive Standard</b> Evaluate the effects of parenting roles and responsibilities on strengthening the well-being of individuals, families, and society.
<b>5.1</b>	<b>Content Standard</b> Analyze roles and responsibilities of parenting.
	Competencies
5.1.1	Analyze parenting roles across the life span.
5.1.2	Analyze expectations and responsibilities of parenting.
5.1.3	Analyze influences of parenting practices on individuals, families, and society.
5.1.4	Analyze societal conditions that influence parenting across the life span.
5.1.5	Explain cultural differences and similarities in roles and responsibilities of parenting.
<b>5.2</b>	<b>Content Standard</b> Evaluate parenting practices that maximize human growth and development.
	Competencies
5.2.1	Analyze nurturing practices that support human growth and development.
5.2.2	Apply communication strategies that promote emotional well-being in family members.
5.2.3	Assess common practices and emerging research about influences of discipline on human growth and development.
5.2.4	Analyze the effects of abuse and neglect on children and families and determine methods for prevention.
5.2.5	Apply criteria for selecting care and services for children and youth.
<b>5.3</b>	<b>Content Standard</b> Evaluate external support systems that provide services for parents.
	Competencies
5.3.1	Analyze community resources and services available to families.
5.3.2	Analyze community resources that provide opportunities related to parenting.
5.3.3	Analyze current laws and policies related to parenting.
5.3.4	Analyze impacts of advocacy on laws and policies related to parenting.
<b>5.4</b>	<b>Content Standard</b>

<b>HS/FCS Foundational Standards</b>	
	Analyze physical and emotional factors related to beginning the parenting process.
	Competencies
5.4.1	Analyze biological processes related to prenatal development, birth, and health of child and mother.
5.4.2	Analyze social, emotional, and environmental factors of prenatal development and birth in relation to the health of parents and child.
5.4.3	Analyze alternatives to biological parenthood.
5.4.4	Examine legal and ethical impacts of current and emerging technology on fertility and family planning.
<b>6.0</b>	<b>Comprehensive Standard</b> Demonstrate nutrition and wellness practices that enhance individual and family well-being.
6.1	Content Standard Analyze factors that influence nutrition and wellness practices across the life span. Competencies
6.1.1	Explain physical, emotional, social, financial, psychological, cultural, and spiritual components of individual and family wellness.
6.1.2	Investigate the effects of psychological, cultural, and social influences on food choices and other nutrition practices.
6.1.3	Investigate the governmental, economic, and technological influences on food choices and practices.
6.1.4	Analyze the effects of global, regional, and local events and conditions on food choices and practices.
6.1.5	Analyze legislation and regulations related to nutrition and wellness.
6.2	Content Standard Examine the nutritional needs of individuals and families in relation to health and wellness across the life span. Competencies
6.2.1	Evaluate the effect of nutrition on health, wellness and performance.
6.2.2	Analyze the relationship of nutrition and wellness to individual and family health throughout the life span.
6.2.3	Analyze the effects of food and diet fads, food addictions, and eating disorders on wellness.
6.2.4	Analyze sources of food and nutrition information, including food labels, related to health and wellness.
6.3	Content Standard Demonstrate ability to acquire, handle, and use foods to meet nutrition and wellness needs of individuals and families across the life span. Competencies
6.3.1	Evaluate the effect of nutrition on health, wellness and performance.
6.3.2	Analyze the relationship of nutrition and wellness to individual and family health throughout the life span.
6.3.3	Analyze the effects of food and diet trends, fads, , food addictions, and eating disorders on wellness.
6.3.4	Analyze sources of food and nutrition information, including food labels, related to health and

<b>HS/FCS Foundational Standards</b>	
	wellness.
6.3.5	Apply current dietary guidelines in planning to meet nutrition and wellness needs.
6.3.6	Design strategies that address the health and nutritional recommendations for individuals and families, including those with special needs.
6.3.7	Demonstrate ability to select, store, prepare, and serve nutritious, aesthetically pleasing food and food product.
6.3.8	Evaluate policies and practices that impact food security, sustainability, food integrity, and nutrition and wellness of individuals and families.
<b>6.4</b>	<b>Content Standard</b> Evaluate factors that affect food safety from production through consumption.
	Competencies
6.4.1	Analyze conditions and practices that promote safe food handling.
6.4.2	Analyze safety and sanitation practices.
6.4.3	Analyze how changes in local, regional, national, and international food production and distribution systems influence the food supply, including sustainability, organic food production and the impact of genetically modified foods.
6.4.4	Investigate federal, state, and local inspection and labeling systems that protect the health of individuals and the public.
6.4.5	Analyze foodborne illness factors, including causes, potentially hazardous foods, and methods of prevention.
6.4.6	Analyze current consumer information about food safety and sanitation.
<b>6.5</b>	<b>Content Standard</b> Evaluate the influence of science and technology on food, nutrition, and wellness.
	Competencies
6.5.1	Investigate how scientific and technical advances influence the nutrient content, availability, and safety of foods.
6.5.2	Analyze how the scientific and technical advances in food processing, storage, product development, and distribution influence nutrition and wellness.
6.5.3	Analyze the effects of technological advances on selection, preparation and home storage of food.
6.5.4	Analyze the effects of food science and technology on meeting nutritional needs.
<b>7.0</b>	<b>Comprehensive Standard</b> Evaluate management practices related to the human, economic, and environmental resources in a global context.
<b>7.1</b>	<b>Content Standard</b> Demonstrate management of individual and family resources such as food, clothing, shelter, health care, recreation, transportation, time, and human capital.
	Competencies
7.1.1	Apply time management, organizational, and process skills to prioritize tasks and achieve goals.
7.1.2	Analyze how individuals and families make choices to satisfy needs and wants.
7.1.3	Analyze decisions about providing safe and nutritious food for individuals and families.

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7.2	Content Standard Analyze the relationship between the global environment and family and consumer resources.
	Competencies
7.2.1	Analyze individual and family responsibility in relation to the environmental trends and issues.
7.2.2	Summarize environmental trends and issues affecting families and future generations.
7.2.3	Demonstrate behaviors that conserve, reuse, and recycle resources to maintain the environment.
7.2.4	Evaluate government regulations for conserving natural resources.
7.3	Content Standard Analyze policies that support consumer rights and responsibilities.
	Competencies
7.3.1	Analyze state and federal policies and laws providing consumer protection.
7.3.2	Analyze how policies become laws relating to consumer rights.
7.3.3	Apply skills to seek information regarding consumer rights.
7.4	Content Standard Evaluate the effects of technology on individual and family resources in a global context.
	Competencies
7.4.1	Analyze the types of technology and software programs that affect family and consumer decision-making.
7.4.2	Analyze how media trends and technological advances influence family and consumer decisions.
7.4.3	Assess the use of technology and its effect on quality of life.
7.5	Content Standard Analyze relationships between the economic system and consumer actions in a global context.
	Competencies
7.5.1	Analyze individual and family roles in the economic system.
7.5.2	Analyze economic effects of laws and regulations that pertain to consumers and providers of services.
7.6	Content Standard Demonstrate management of financial resources to meet the goals of individuals and families across the life span.
	Competencies
7.6.1	Evaluate the need for personal and family financial planning.
7.6.2	Apply financial management principles to individual and family financial practices.
7.6.3	Apply management principles and risk management strategies (including insurance) to decisions about asset protection and financial health for individuals and families.
7.6.4	Evaluate personal and legal documents related to effective management of individual and family finances.
7.6.5	Analyze the risk factors for consumers who are unbanked.
7.6.6	Evaluate banks, credit unions, payday lenders, and check cashing services within other

<b>HS/FCS Foundational Standards</b>	
	businesses where individuals and family members turn for money management and cash flow options.
7.7	Content Standard
	Demonstrate the ability to use knowledge and skills to manage one's financial resources effectively for a lifetime of financial security.
	Competencies
7.7.1	Demonstrate management of individual and family finances by applying reliable information and systematic decision-making.
7.7.2	Analyze how education, income, career, and life choices relate to achieving financial goals.
7.7.3	Analyze financial goals, budgets, and expense tracking to understand effective money management strategies.
7.7.4	Manage credit and debt to remain both creditworthy and financially secure.
7.7.5	Analyze the features of insurance, its role in balancing risk and benefits in financial planning.
7.7.6	Analyze saving and investing to build financial security and wealth.
7.7.7	Analyze the difference between net and gross pay, the impact of taxes, and the added financial benefits an employer may provide.
7.8	Content Standard
	Analyze factors, including cultural, political, and geographical influences, that affect consumer advocacy.
7.8.1	Demonstrate strategies that enable consumers to become advocates.
7.8.2	Analyze the effects of consumer protection laws on advocacy.
7.8.3	Apply strategies to reduce the risk of consumer fraud and identity theft.
7.8.4	Analyze the role of media in consumer advocacy and consumer fraud.
7.8.5	Examine the effects of government, business, and industry regulations, policies, and procedures on advocacy.
8.0	Comprehensive Standard
	Evaluate product development testing and presentation processes
8.1	Content Standard
	Demonstrate skills needed for product development, testing, and presentation.
8.1.1	Conduct market research to determine consumer trends and product development needs for diverse populations.
8.1.2	Design or analyze a consumer product.
8.1.3	Analyze features, prices, product information, styles, and performance of consumer goods for potential global impact and trade-offs among the components.
8.1.4	Evaluate a product utilizing valid and reliable testing procedures.
8.1.5	Apply statistical analysis processes to interpret, summarize, and report data from tests.
8.1.6	Evaluate the labeling, packaging, and support materials of consumer goods.
8.1.7	Demonstrate a plan to educate an audience about a new product on the consumer market.
8.1.8	Utilize appropriate marketing and sales techniques to aid consumers in the selection of goods and services that meet consumer needs.
9.0	Comprehensive Standard
	Evaluate safety and sanitation processes
9.1	Content Standard

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	Demonstrate sanitation procedures for a clean and safe environment.
	Competencies
9.1.2	Analyze the various types of cleaning methods and their environmental effects.
9.1.3	Summarize federal and state regulations regarding safe handling, usage, and storage of chemicals.
9.1.4	Apply Occupational Safety and Health Administration (OSHA) regulations to safety procedures for bloodborne pathogens present in blood and body fluids.
9.1.5	Select a pest control system appropriate for the facility and the type(s) of pests likely to be present.
9.1.6	Utilize Centers for Disease Control (CDC) standards.
9.1.7	Integrate Americans with Disabilities Act (ADA) regulations.
9.2	<b>Content Standard</b> Apply hazardous materials and waste management procedures.
	Competencies
9.2.1	Investigate local, federal, and state regulations and geographic and cultural influences regarding waste management.
9.2.2	Demonstrate a waste minimization plan.
9.2.3	Practice a recycling program for conservation of resources.
9.2.4	Record presence of hazardous materials and occurrence of hazardous situations accurately and communicate to appropriate authorities.
9.2.5	Describe procedures for safely handling and storing hazardous materials and waste products.
9.2.6	Design energy efficient methods for waste management in diverse settings.
9.2.7	Investigate safe storage and disposal of pesticides.
9.3	<b>Content Standard</b> Demonstrate a work environment that provides safety and security.
	Competencies
9.3.1	Design procedures for external and internal emergencies.
9.3.2	Apply security procedures.
9.3.3	Demonstrate safe procedures in the use, care, and storage of equipment.
9.3.4	Apply safety and security procedures as required by Hazard Analysis and Critical Control Point (HACCP), Occupational Safety and Health Administrations (OSHA), and other agencies.
9.3.5	Apply procedures for control of infection and infectious materials.

<b>Human and Family Services</b>	
<b>10.0</b>	<b>Comprehensive Standard</b> Synthesize knowledge, skills, and practices required for careers in family & human services.
10.1	Content Standard Analyze factors in providing family and human services.
	Competencies
10.1.1	Describe local, state, and national agencies and informal support resources providing human services.
10.1.2	Analyze professional, ethical, legal, and safety issues for human services employees.
10.1.3	Evaluate licensing laws and regulations that affect service providers and their participants.
10.1.4	Analyze harmful, fraudulent, unethical, and deceptive human services practices.
10.1.5	Summarize the rights and responsibilities of human service participants and their families.
10.1.6	Analyze effective self-advocacy strategies for human services professionals.
10.1.7	Investigate community-networking opportunities in family and human services.
10.2	Content Standard Demonstrate professional behaviors, skills, and knowledge in providing family and human services.
	Competencies
10.2.1	Evaluate rules, regulations, legal and work site policies that affect employer, employee, personal, and family rights and responsibilities.
10.2.2	Demonstrate professional and ethical behavior with peers in a variety of settings.
10.2.3	Analyze procedures for maintaining accurate, secure, and confidential documentation and submission practices.
10.2.4	Perform formal and informal assessment practices that evaluate participants' strengths, needs, preferences, and interests across the life span.
10.2.5	Demonstrate use of current and evolving technology in human services.
10.3	Content Standard Analyze the impact of conditions that could influence the well-being of individuals and families.
	Competencies
10.3.1	Investigate health, wellness, financial and safety issues of individual and families with a variety of conditions that could influence their well-being.
10.3.2	Analyze the use of resources in making choices that satisfy needs and wants of individuals, families, and communities.
10.3.3	Analyze management and living environment issues of individuals and family conditions that influence their well-being.
10.3.4	Analyze personal, social, emotional, economic, vocational, educational, and recreational issues of individuals and family conditions that influence their well-being.
10.3.5	Differentiate between situations that require personal prevention or intervention and those situations that require professional assistance.

<b>Human and Family Services</b>	
10.3.6	Analyze situations which require crisis intervention.
10.3.7	Summarize the appropriate support needed to address selected human services issues.
10.3.8	Summarize information about procuring and maintaining health care and health insurance to meet the needs of individuals and family members.
10.4	<b>Content Standard</b> Evaluate services for individuals and families with a variety of conditions that could impact their well-being.
	Competencies
10.4.1	Describe needs and accommodations for people with a variety of conditions that could affect their well-being.
10.4.2	Apply consumer skills to acquire and maintain transportation that meets the needs of individuals and family members.
10.4.3	Analyze ways in which individuals with conditions that affect their well-being impact the family and family members financially, socially, physically, and emotionally over the lifespan.
10.4.4	Analyze practices that allow families to maintain economic self-sufficiency.
10.4.5	Illustrate coping or adjustment strategies and stress management practices for the participant, a caregiver, and family members.
10.4.6	Summarize the impact of friends, family, and community relationships for individuals with a variety of conditions that affect their well-being.
10.4.7	Demonstrate ways to provide support that validates the participants' capabilities and right to privacy, dignity, and autonomy.
10.4.8	Identify strategies that help participants make informed choices, access resources and support, follow through on responsibilities, and take appropriate risks.
10.4.9	Demonstrate effective verbal and nonverbal communication skills that support individuals and families with a variety of conditions that could affect their well-being.

<b>Hospitality, Food Production, and Nutrition Services</b>	
<b>11.0</b>	<b>Comprehensive Standard</b> Integrate knowledge, skills, and practices required for careers in food production and services, hospitality, and nutrition services.
11.1	Content Standard Demonstrate food safety and sanitation procedures.
	Competencies
11.1.1	Identify characteristics of major foodborne pathogens, their role in causing illness, foods involved in outbreaks, and methods of prevention.
11.1.2	Employ food service management safety/sanitation program procedures, including CPR and first aid.
11.1.3	Use knowledge of systems for documenting, investigating, reporting, and preventing foodborne illness.
11.1.4	Use the Hazard Analysis Critical Control Point (HACCP) and crisis management principles and procedures during food handling processes to minimize the risks of foodborne illness.
11.1.5	Practice standard personal hygiene and wellness procedures.
11.1.6	Demonstrate proper purchasing, receiving, storage, and handling of both raw and prepared foods.
11.1.7	Demonstrate safe food handling and preparation techniques that prevent cross contamination from potentially hazardous foods and food groups.
11.1.8	Analyze current types of cleaning and sanitizing materials for proper use.
11.1.9	Use the Occupational Safety and Health Administration (OSHA) Right to Know Law and Materials Safety Data Sheets (MSDS) and explain their requirements in safe handling and storage of hazardous materials.
11.1.10	Demonstrate safe and environmentally responsible waste disposal and recycling methods.
11.1.11	Demonstrate ability to maintain necessary records to document time and temperature control, HACCP, employee health, maintenance of equipment, and other elements of food preparation, storage, and presentation.
11.2	Content Standard Demonstrate industry standards in selecting, using, and maintaining food production and food service equipment.
	Competencies
11.2.1	Operate tools and equipment following safety procedures and OSHA requirements.
11.2.2	Maintain tools and equipment following safety procedures and OSHA requirements.
11.2.3	Demonstrate procedures for cleaning and sanitizing equipment, serving dishes, glassware, and utensils to meet industry standards and OSHA requirements.
11.2.4	Analyze equipment purchases based on long-term business needs, specific regulations, and codes related to foods.
11.2.5	Demonstrate procedures for safe and secure storage of equipment and tools.

<b>Hospitality, Food Production, and Nutrition Services</b>	
11.2.6	Identify a variety of types of equipment for food processing, cooking, holding, storing, and serving.
11.3	<b>Content Standard</b> Evaluate nutrition principles, food plans, preparation techniques and specialized dietary plans.
	<b>Competencies</b>
11.3.1	Analyze nutrient requirements across the life span addressing the diversity of people, culture, and religions.
11.3.2	Analyze nutritional data.
11.3.3	Apply principles of food production to maximize nutrient retention in menus.
11.3.4	Assess the influence of cultural, socioeconomic and psychological factors on food and nutrition and behavior.
11.3.5	Analyze recipe/formula proportions, ingredients, and modifications for food production.
11.3.6	Critique the selection of foods and ingredients to promote a healthy lifestyle.
11.3.7	Plan menus, applying the exchange system to meet various nutrient needs.
11.4	<b>Content Standard</b> Demonstrate menu planning principles and techniques based on standardized recipes to meet customer needs.
	<b>Competencies</b>
11.4.1	Use computer-based menu systems to develop and modify menus.
11.4.2	Apply menu-planning principles to develop and modify menus.
11.4.3	Analyze food, equipment, and supplies needed for menu production.
11.4.4	Develop a variety of menu layouts, themes, and design styles.
11.4.5	Prepare requisitions for food, equipment, and supplies to meet production requirements.
11.4.6	Record performance of menu items to analyze sales and determine menu revisions.
11.4.7	Apply principles of measurement, portion control, conversions, food cost analysis and control, menu terminology, and menu pricing to menu planning.
11.5	<b>Content Standard</b> Demonstrate professional food preparation methods and techniques for all menu categories to produce a variety of food products that meet customer needs.
	<b>Competencies</b>
11.5.1	Demonstrate professional skills in safe handling of knives, tools, and equipment.
11.5.2	Demonstrate professional skill for a variety of cooking methods including roasting, broiling, smoking, grilling, sautéing, pan frying, deep frying, braising, stewing, poaching, steaming, and baking using professional equipment and current technologies.
11.5.3	Demonstrate knowledge of portion control and proper scaling and measurement techniques.

<b>Hospitality, Food Production, and Nutrition Services</b>	
11.5.4	Apply the fundamentals of time, temperature, and cooking methods to cooking, cooling, reheating, and holding of a variety of foods.
11.5.5	Prepare various meats, seafood, and poultry using safe handling and professional preparation techniques.
11.5.6	Prepare various stocks, soups, and sauces using safe handling and professional preparation techniques.
11.5.7	Prepare various fruits, vegetables, starches, legumes, dairy products, fats, and oils using safe handling and professional preparation techniques.
11.5.8	Prepare various salads, dressings, marinades, and spices using safe handling and professional preparation techniques.
11.5.9	Prepare sandwiches, canapes and appetizers using safe handling and professional preparation techniques.
11.5.10	Prepare breads, baked goods and desserts using safe handling and professional preparation techniques.
11.5.11	Prepare breakfast meats, eggs, cereals, and batter products using safe handling and professional preparation techniques.
11.5.12	Demonstrate professional plating, garnishing, and food presentation techniques.
11.5.13	Integrate sustainability in food production and services including menu planning; acquisition, preparation, and serving of food; storage; and recycling and waste management.
11.5.14	Demonstrate cooking methods that increase nutritional value, lower calorie and fat content, and utilize herbs and spices to enhance flavor.
11.6	<b>Content Standard</b> Demonstrate implementation of food service management and leadership functions.
	<b>Competencies</b>
11.6.1	Apply principles of purchasing, receiving, and storing in food service operations.
11.6.2	Practice inventory procedures including first in/first out concept, date marking, and specific record-keeping.
11.6.3	Apply accounting procedures in planning and forecasting profit and loss.
11.6.4	Examine the areas of risk management and legal liability within the food service industry.
11.6.5	Apply human resource policies including rules, regulations, laws, hiring, compensation, overtime, discrimination, and harassment.
11.6.6	Apply the procedures involved in staff planning, recruiting, interviewing, selecting, scheduling, performance reviewing, and terminating of employees.
11.6.7	Conduct staff orientation, initial training and education, consistent reinforcement of training principles, and on the job training/retraining.
11.6.8	Implement marketing plans for food service operations.
11.6.9	Design internal/external crisis management and disaster plans and response procedures.
11.6.10	Apply principles of inventory management, labor cost and control techniques, production planning and control, sustainability, and facilities management to

<b>Hospitality, Food Production, and Nutrition Services</b>	
	planning and front and back of the house operations.
11.7	Content Standard Demonstrate the concept of internal and external customer service.
	Competencies
11.7.1	Analyze the role of quality service as a strategic component of exceptional performance.
11.7.2	Demonstrate quality service techniques and procedures that meet industry standards in the food service industry.
11.7.3	Analyze the relationship between employee attitude and skills and customer satisfaction.
11.7.4	Apply procedures for addressing and resolving complaints.
11.7.5	Demonstrate sensitivity to diversity and special needs.
11.8	Content Standard Apply basic concepts of nutrition and nutrition therapy in a variety of settings, considering social, geographical, cultural, and global influences.
	Competencies
11.8.1	Analyze nutritional needs of individuals.
11.8.2	Use nutritional information to support care planning.
11.8.3	Determine when to provide a selective menu approach in nutrition therapy settings.
11.8.4	Construct a modified diet based on nutritional needs and health conditions.
11.8.5	Design instruction on nutrition to promote wellness and disease prevention.
11.9	Content Standard Demonstrate use of science and technology advancements in food product development and marketing.
	Competencies
11.9.1	Analyze various factors that affect food preferences in the marketing of food to a variety of populations.
11.9.2	Analyze data in statistical analysis when making development and marketing decisions.
11.9.3	Prepare food for presentation and assessment.
11.9.4	Maintain test kitchen/ laboratory and related equipment and supplies.
11.9.5	Implement procedures that affect quality product performance and sustainability.
11.9.6	Conduct sensory evaluations of food products.
11.9.7	Conduct testing for safety of food products, utilizing available technology.
11.10	Content Standard Demonstrate food science, dietetics, and nutrition management principles and practices.
	Competencies
11.10.1	Build menus to customer/ client preferences.

<b>Hospitality, Food Production, and Nutrition Services</b>	
11.10.2	Implement food preparation, production, and testing systems.
11.10.3	Apply standards for food quality and sustainability.
11.10.4	Create standardized recipes.
11.10.5	Manage food production to meet needs and preferences of diverse customer populations.
11.10.6	Analyze new products utilizing most current guidelines and innovations in technology.
11.10.7	Implement procedures that provide cost effective products.
11.10.8	Establish par levels for the purchase of supplies based on an organization's needs.
11.10.9	Utilize Food Code Points of time, temperature, date markings, cross contamination, hand washing, and personal hygiene as criteria for safe food preparation.
11.11	<b>Content Standard</b> Demonstrate principles of food biology and chemistry.
	Competencies
11.11.1	Explain the properties of elements, compounds, and mixtures in foods and food products.
11.11.2	Analyze the effects of thermodynamics on chemical reactions in foods and food products.
11.11.3	Explain the process of ionization in the formation of acids and bases and effect on food and food products.
11.11.4	Explain the impact of molecular structure of simple and complex carbohydrates on digestion, nutrition, and food preparation procedures.
11.11.5	Relate the composition of lipids and proteins to their functions in foods and their impact on food preparation and nutrition.
11.11.6	Explain the value of molds and enzymes in food products.
11.11.7	Analyze the impact of food presentation methods and techniques on nutrient value, safety and sanitation, and consumer appeal of food and products.
11.12	<b>Content Standard</b> Demonstrate procedures applied to safety, security, and environmental issues.
	Competencies
11.12.1	Explain the importance of safety, security, and environmental issues related to the hospitality, tourism, and recreation industries.
11.12.2	Demonstrate procedures for assuring guest or customer safety.
11.12.3	Evaluate evacuation plans and emergency procedures.
11.12.4	Demonstrate management and conservation of resources for energy efficiency and protection of the environment.
11.12.5	Design a system for documenting, investigating, and taking action on safety, security, and environmental issues.
11.13	<b>Content Standard</b> Apply concepts of quality service to ensure customer satisfaction.
	Competencies

<b>Hospitality, Food Production, and Nutrition Services</b>	
11.13.1	Apply industry standards for service that meets cultural and geographic expectations of guests or customers.
11.13.2	Analyze how employee dispositions can impact customer satisfaction.
11.13.3	Apply a system to evaluate and resolve employee, employer, guest, or customer complaints.
11.13.3	Analyze effects of customer relations on success of the hospitality, tourism, and or recreation industry.
11.13.4	Demonstrate effective cultural awareness and customer relations to meet the hospitality, tourism, and recreation needs of special populations.
11.14	<b>Content Standard</b> Demonstrate practices and skills involved in hospitality and lodging occupations.
	Competencies
11.14.1	Demonstrate front desk, office, and customer service skills.
11.14.2	Demonstrate accounting practices and financial transactions.
11.14.3	Manage convention, meeting, and banquet support functions.
11.14.4	Apply basic food preparation and service skills in catering operations.
11.14.5	Manage use, care, storage, maintenance, and safe operations of equipment, tools, and supplies.
11.14.6	Apply facility management, maintenance, and service skills to hospitality and lodging operations.
11.14.7	Apply time and work management skills to facility service tasks.
11.14.8	Analyze sales and marketing functions in hospitality and lodging operations.
11.15	<b>Content Standard</b> Demonstrate practices and skills for travel related services.
	Competencies
11.15.1	Investigate geography, climate, sites, time zones, and political and global influences of various regions and countries.
11.15.2	Investigate hospitality, lodging, tourism, and recreation customs of various regions and countries.
11.15.3	Apply knowledge of food, beverage, and etiquette of various regions and countries to decisions about hospitality, lodging, tourism, and recreation.
11.15.4	Research regulations and cultural expectations to determine information needed for diverse clientele for domestic and international travel.
11.15.5	Create travel documents and itineraries, utilizing current technology.
11.15.6	Analyze travel arrangements using computerized systems.
11.16	<b>Content Standard</b> Demonstrate management of recreation, leisure, and other programs and events.
	Competencies
11.16.1	Coordinate client inquiries and requests.
11.16.2	Design themes, timelines, budgets, agendas, and itineraries for specific programs and

<b>Hospitality, Food Production, and Nutrition Services</b>	
	events.
11.16.3	Organize resources and information about locations, facilities, suppliers, and vendors for specific services.
11.16.4	Prepare event materials for distribution.
11.16.5	Demonstrate skills related to promoting and publicizing events.
11.16.6	Manage programs and events for specific age groups or diverse populations.
11.16.7	Promote wellness initiatives through recreation and leisure programs and events.
11.16.8	Evaluate overall effectiveness of specific events.
11.16.9	Describe tourism related organizations and agencies and their impact on hospitality, lodging, travel, and recreation operations.

<b>Housing, Fashion, and Design</b>	
<b>12.0</b>	<b>Comprehensive Standard</b> Integrate knowledge, skills, and practices required for careers in housing and interior design, fashion and apparel design, and textiles.
12.1	<b>Content Standard</b> Analyze the value of interior, fashion, and apparel design to individuals, families, and society including the financial benefits and the impact of housing, interior design, and apparel careers on individual/family, local, state, national, and global economies.
	Competencies
12.1.1	Analyze the effects of textiles, fashion, and apparel industries on local, state, national, and global economies.
12.1.2	Apply consumer skills to decisions about housing, utilities, and furnishings.
12.2	<b>Content Standard</b> Evaluate housing and design concepts and theories, including sustainability and universal design, in relation to available resources and options.
	Competencies
12.2.1	Evaluate the use of elements and principles of design in housing and commercial and residential interiors.
12.2.2	Analyze the psychological impact that the principles and elements of design have on the individual.
12.2.3	Analyze the effects that the principles and elements of design have on aesthetics and function.
12.2.4	Apply principles of human behavior, ergonomics, and anthropometrics to the design of housing, interiors, and furnishings.
12.3	<b>Content Standard</b> Analyze the effects of textiles, fashion, and apparel industries on local, state, national, and global economies.
	Competencies
12.3.1	Apply appropriate terminology for identifying, comparing, and analyzing the most common generic textile fibers and fabrics.
12.3.2	Evaluate performance characteristics of textile fiber and fabrics.
12.3.3	Analyze textile legislation, standards, and labeling in the global economy.
12.3.4	Analyze characteristics of textile components in the design, construction, care, use, maintenance, and disposal or recycling of products.
12.3.5	Demonstrate appropriate procedures for care and disposal or recycling of textile products, considering diverse needs locally and globally.
12.3.6	Evaluate fibers and fabrics for sustainability factors.
12.3.7	Evaluate quality of textiles, fashion, and apparel construction and fit.
12.4	<b>Content Standard</b> Apply residential and commercial interior design knowledge, skills and processes to meet specific design needs.
	Competencies
12.4.1	Analyze product information, including but not limited to floor coverings, wall coverings, textiles, window treatments, furniture, lighting fixtures, kitchen and bath fixtures and

<b>Housing, Fashion, and Design</b>	
	equipment.
12.4.2	Evaluate manufacturers, products, and materials considering building codes and regulations, environmental protection, care and maintenance, and safety issues.
12.4.3	Demonstrate measuring, estimating, ordering, purchasing, pricing, and repurposing skills.
12.4.4	Appraise various interior furnishings, finishes, fixtures, appliances, and equipment to provide cost and quality choices for clients.
12.4.5	Examine the impact of housing, interiors, and furnishings on the health, safety, and welfare of the public.
12.4.6	Demonstrate design processes such as determining the scope of the project, programming, research, concept development, schematic design, design drawing, and design development and presentation.
12.5	<b>Content Standard</b> Demonstrate textiles, fashion, and apparel design skills.
	<b>Competencies</b>
12.5.1	Explain the ways in which fiber, fabric, texture, pattern, and finish can affect visual appearance.
12.5.2	Apply basic and complex color schemes and color theory to develop and enhance visual effects.
12.5.3	Utilize elements and principles of design in designing, constructing, and/or altering textiles, fashion, and apparel.
12.5.4	Demonstrate design concepts using fiber, fabric or digital means, employing draping and/or flat pattern making techniques.
12.5.5	Generate design that demonstrates consideration for ecological, environmental, ethnic, sociological, psychological, technical, and economic trends and issues.
12.5.6	Apply elements and principles of design to assist consumers and businesses in making decisions.
12.5.7	Demonstrate ability to use technology for fashion, apparel, and textile design.
12.5.8	Evaluate the impact of history of design and designers, arts and culture, trend setters, and global influences on textiles, fashion, and apparel.
12.6	<b>Content Standard</b> Demonstrate skills needed to produce, alter, or repair textiles, fashion, and apparel.
	<b>Competencies</b>
12.6.1	Demonstrate professional skills in using traditional and technologically innovative equipment, tools, and supplies in textiles, fashion, and apparel construction, alteration, repair, and recycling.
12.6.2	Explain production processes for creating fibers, yarns, woven and knit fabrics, and non-woven textile products.
12.6.3	Use appropriate industry products and materials for cleaning, pressing, and finishing textiles, fashion, and apparel.
12.6.4	Analyze current technology, trends, and innovations that facilitate design and production of textiles, fashion, and apparel.
12.6.5	Demonstrate basic skills for production, alteration, repair and recycling of textiles, fashion, and apparel.
12.7	<b>Content Standard</b>

<b>Housing, Fashion, and Design</b>	
	Apply consumer skills to providing and maintaining clothing.
	Competencies
12.7.1	Demonstrate laundering processes aligned with industry standards and regulations.
12.7.2	Summarize the functions of machines and equipment used in laundering operations.
12.7.3	Demonstrate standard laundry procedures.
12.7.4	Apply procedures for the selection of textiles, chemicals, and equipment in the laundering process.
12.7.5	Apply industry regulations to maintaining quality in laundry/linen systems.
12.8	<b>Content Standard</b> Evaluate client's needs, goals, and resources in creating design plans for housing and residential and commercial interiors.
	Competencies
12.8.1	Assess financial resources needed to improve interior space.
12.8.2	Apply consumer skills to decisions about housing, utilities, and furnishings.
12.8.3	Assess client's community, family, and financial resources needed to achieve housing and interior design goals.
12.8.4	Assess a variety of available resources for housing and interior design, such as evidence-based design that accounts for human factors and issues of human behavior.
12.8.5	Critique design plans to address client's needs, goals and resources.
12.8.6	Justify design solutions relative to client needs, including diversity and cultural needs, and the design process.
12.8.7	
12.9	<b>Content Standard</b> Apply design knowledge, skills, processes, and theories and oral, written, and visual presentation skills to communicate design ideas.
	Competencies
12.9.1	Select appropriate studio tools.
12.9.2	Prepare sketches, elevations, perspectives, and renderings using appropriate media.
12.9.3	Prepare visual presentations including legends, keys, and schedules.
12.9.4	Utilize a variety of presentation media including drawings, photography, video, computer, and software for client presentations.
12.9.5	Utilize applicable building codes and universal design regulations and guidelines in space planning.
12.9.6	Create floor plans using architectural drafting skills and computer aided design software.
12.10	<b>Content Standard</b> Evaluate elements of textiles, fashion, and apparel merchandising.
	Competencies
12.10.1	Apply marketing strategies for textiles, fashion, and apparel in the global marketplace.
12.10.2	Analyze the cost of constructing, manufacturing, distributing, altering, repairing or recycling textiles, fashion, and apparel.
12.10.3	Analyze ethical considerations for merchandising textiles, fashion, and apparel.
12.10.4	Analyze external factors that influence merchandising.
12.10.5	Critique a variety of methods for promoting textiles, fashion and apparel to diverse populations.

<b>Housing, Fashion, and Design</b>	
12.10.6	Apply research methods, including forecasting techniques, for marketing textiles, fashion, and apparel.
12.11	<b>Content Standard</b> Analyze professional practices and procedures for business profitability and career success, and the role of ethics in the housing, interiors and furnishings industries.
	<b>Competencies</b>
12.11.1	Examine legislation, regulations, and public policy that affect residential and commercial interior design as well as the housing and furnishings industries.
12.11.2	Analyze personal and employer responsibilities and liabilities regarding industry related safety, security, and environmental factors.
12.11.3	Describe security and inventory control strategies, laws and regulations, and worksite policies and procedures that affect loss prevention and profit.
12.11.4	Demonstrate procedures for reporting and handling accidents, safety, and security incidents.
12.11.5	Apply procedures for maintaining inventory control and loss prevention, including cash and credit transactions.
12.11.6	Analyze operational costs such as mark ups, mark downs, raw materials, cash flow, and other factors affecting profit.
12.11.7	Demonstrate knowledge of the arts, of various resources, and of cultural impact upon design industries.
12.11.8	Demonstrate knowledge of multi-disciplinary collaboration and consensus building skills needed in practice.
12.12	<b>Content Standard</b> Develop a global view to weigh design decisions with the parameters of sustainability and socioeconomic and cultural contexts within the housing, interior design, fashion, and furnishing industries.
12.12.1	<b>Competencies</b>
12.12.2	Demonstrate knowledge and skills to incorporate recycle and redesign principles.
12.12.3	<b>Content Standard</b> Evaluate the components of customer service.
12.12.4	<b>Competencies</b>
12.12.5	Analyze factors that contribute to quality customer relations.
12.12.6	Analyze the influences of cultural expectations as a factor in customer relations.
12.12.7	Demonstrate the skills necessary for quality customer service.
12.12.8	Create solutions to address customer concerns.
12.13	<b>Content Standard</b> Demonstrate planning, organizing, and maintaining an efficient operation of residential or commercial facilities.
	<b>Competencies</b>
12.13.1	Apply environmental services standards and procedures in residential and commercial settings.
12.13.2	Operate cleaning equipment and tools.
12.13.3	Manage use of supplies.

<b>Housing, Fashion, and Design</b>	
12.13.4	Maintain building interior surfaces, wall coverings, fabrics, furnishings, and floor surfaces.
12.13.5	Perform facilities maintenance based on established standards and procedures.
12.13.6	Analyze energy efficient methods and practices in a variety of geographic and cultural settings.
12.14	<b>Content Standard</b> Demonstrate facilities management functions.
	<b>Competencies</b>
12.14.1	Demonstrate quality customer service which exceeds customer expectations in diverse settings.
12.14.2	Demonstrate the elements involved in staff planning, recruiting, interviewing, selecting, hiring, and terminating of employees.
12.14.3	Design staff schedules that meet industry needs and consider individual diversity.
12.14.4	Conduct orientation, regular training and education, and on the job training/retraining, considering employee diversity.
12.14.5	Demonstrate techniques and strategies to evaluate employee effectiveness.
12.14.6	Apply principles of purchasing and receiving in facility management operations.
12.14.7	Implement procedures to control inventory.
12.14.8	Apply accounting principles in planning, forecasting, and recording profit and loss.
12.14.9	Develop a marketing plan for a business or department.

<b>Education and Training</b>	
<b>13.0</b>	<b>Comprehensive Standard</b> Integrate knowledge, skills, and practices required for careers in early childhood, education, and services.
13.1	Content Standard Analyze developmentally appropriate and culturally responsive practices to plan for early childhood, education, and services.
13.1.1	Competencies
13.1.2	Analyze child development theories and their implications for educational and childcare practices.
13.1.3	Explore assessment tools and methods to observe and interpret children's growth and development and apply to assess growth and development across the lifespan.
13.1.4	Analyze cultural and environmental influences when assessing development of children, youth and adults.
13.1.5	Address specific developmental needs of children, youth and adults based on assessment of their abilities.
13.1.6	Analyze strategies that promote growth and development of children, youth and adults.
13.2	Content Standard Demonstrate integration of curriculum and instruction to meet developmental needs and interests of children, youth and adults, considering gender, ethnicity, geographical, cultural, and global influences.
	Competencies
13.2.1	Analyze a variety of curriculum and instructional models.
13.2.2	Implement learning activities in all curriculum areas that meet the developmental needs of learners.
13.2.3	Implement an integrated curriculum that incorporates a learner's language, learning styles, early experiences, and cultural values.
13.2.4	Demonstrate a variety of teaching methods to meet individual needs of learners.
13.2.5	Arrange the classroom environment to provide for learners' exploration, discovery, development, and reflection through multiple methods including learning centers.
13.2.6	Establish effective activities, routines, and transitions for various age groups.
13.3	Content Standard Demonstrate a safe and healthy learning environment for children, youth and adults.
	Competencies
13.3.1	Manage physical space to maintain a learning environment that is safe and healthy and encourages physical activity.
13.3.2	Apply safe and healthy practices that comply with local, state, and federal regulations to assure learners' safety.
13.3.3	Implement strategies to teach health, safety, and sanitation habits.
13.3.4	Plan safe and healthy meals and snacks that meet USDA standards.
13.3.5	Document symptoms of abuse and neglect and use appropriate procedures to report suspected abuse or neglect to the designated authorities.
13.3.6	Implement basic health practices and prevention procedures for workers and learners regarding illness, communicable diseases, accidents and trauma.

<b>Education and Training</b>	
13.3.7	Demonstrate security and emergency procedures.
13.4	<b>Content Standard</b> Demonstrate skills for building and maintaining positive collaborative relationships with children, youth and adults in their family and community environments, considering gender, ethnicity, geographical, cultural, and global influences.
13.4.1	<b>Competencies</b>
13.4.2	Apply developmentally appropriate and culturally responsive guidelines for behavior.
13.4.3	Demonstrate problem-solving and decision-making skills when working with children, youth and adults.
13.4.4	Demonstrate interpersonal skills that promote positive and productive relationships with learners.
13.4.5	Implement strategies for constructive and supportive interactions between children, youth and adults and their families and communities.
13.4.6	Analyze learners' developmental progress and summarize developmental issues and concerns.
13.5	<b>Content Standard</b> Demonstrate professional practices and standards related to working with children, youth and adults, including diverse populations.
	<b>Competencies</b>
13.5.1	Explore opportunities for continuing training and education.
13.5.2	Apply professional ethical standards as accepted by the recognized professional organizations.
13.5.3	Implement federal, state, and local standards, policies, regulations, and laws that affect programs for children, youth and adults and their families.
13.5.4	Demonstrate enthusiasm, initiative, and commitment to program goals and improvements.
13.5.5	Examine entrepreneurial aptitude, management skills, and financial resources needed for planning businesses in early childhood, education, and services.
13.5.6	Identify ways educators can advocate to influence policies, agencies, and institutions for the benefit of children, youth and adults and their families.

*For additional information: <http://www.nasafacs.org/national-standards-and-competencies.html>*

<b>Foundational Standards for Information Technology</b>
<b>Cluster Topic 1: IT 1 Core-Business Skills</b>
IT 1 Core-Business Skills Cluster Knowledge and Skill Statement: <b>Understand business concepts, tools, and creativity necessary in the workplace.</b>
<b>Performance Elements:</b>
<b>IT 1.1 Demonstrate ability to utilize computing devices (e.g., printers, phone, digital cameras, multi-media equipment, video and scanners).</b>
<b>Measurement Criteria:</b>
IT 1.1.1 Demonstrate touch keyboarding and use computer functions to create documents and visualizations/tables. (3A-DA-11)
IT 1.1.2 Select and use appropriate digital tools for solving problems.
IT 1.1.3 Demonstrate the functionality of computing devices and identify proper usage.
<b>IT 1.2 Demonstrate workplace expectations (e.g. dress, promptness, attendance, interpersonal skills, completion of assigned tasks).</b>
<b>Measurement Criteria:</b>
IT 1.2.1 Identify and list workplace expectations.
IT 1.2.2 Compare school expectations to work expectations.
IT 1.2.3 Demonstrate punctuality.
IT 1.2.4 Demonstrate teamwork skills.
IT 1.2.5 Explain the relationship between team and individual performance.
IT 1.2.6 Demonstrate appropriate electronic etiquette.
<b>IT 1.3 Identify IT organizational structures and roles.</b>
<b>Measurement Criteria:</b>
IT 1.3.1 Identify the organizational structure of an IT department.
IT 1.3.2 Identify various roles in IT (e.g. help desk, system administrator, programmers, analyst, project managers).
IT 1.3.3 Identify examples of chains of command and the communication channels within an Organization.
<b>IT 1.4 Describe current trends in technology.</b>
<b>Measurement Criteria:</b>
IT 1.4.1 Discuss new technologies (e.g. cloud computing outsourcing, mobile, artificial intelligence, data analytics, digital currency).
IT 1.4.2 Describe how artificial intelligence drives many software and physical systems. (3B- AP-09)
IT 1.4.3 Describe types of businesses and how technology impacts their operations.
IT 1.4.4 Compare and contrast online vs. brick and mortar enterprises.
IT 1.4.5 Explain the importance of security.
<b>IT 1.5 Discuss and understand challenges and opportunities facing the IT Industry.</b>
<b>Measurement Criteria:</b>
IT 1.5.1 Discuss the pace of change in technology and how it affects business.
IT 1.5.2 Understand the difference between in-house IT and outsourced IT and how to work with removed workers.
IT 1.5.3 Understand the IT employment opportunities and job growth and how it affects the IT student <a href="http://futurereadyiowa.gov">futurereadyiowa.gov</a> .

<b>Foundational Standards for Information Technology</b>
IT 1.5.4 Demonstrate an awareness of potential government compliance requirements (e.g. patient privacy, confidentiality, security).
<b>IT 1.6 Demonstrate the ability to understand business information.</b>
<b>Measurement Criteria:</b>
IT 1.6.1 Demonstrate understanding of core business processes (marketing, finance, sales, and operations).
IT 1.6.2 Demonstrate understanding of reporting tools (dashboards, spreadsheets, and charts).
<b>IT 1.7 Recognize legal, social, cultural and ethical issues related to information technology. (3A-IC-24)</b>
<b>Measurement Criteria:</b>
IT 1.7.1 Research the Code of Ethics for a professional IT organization such as Association for Information Technology Professionals.
IT 1.7.2 Identify illegal and unethical activities and practices.
IT 1.7.3 Research the penalties for software copyright violations and intellectual property laws. (3A-IC-28)
IT 1.7.4 Understand ownership of information. (3A-AP-20)
IT 1.7.5 Debate laws and regulations that impact the development and use of software. (3B-IC-28)
<b>IT 1.8 Demonstrate an understanding of the need for security from a workplace standpoint.</b>
<b>Measurement Criteria:</b>
IT 1.8.1 Research recent security events that have affected the workplace and discuss their impact.
IT 1.8.2 Identify common security threats such as hacking, viruses, phishing, malware, and physical Security. (3A-NI-05)
IT 1.8.3 Demonstrate best practices as a user to prevent security breaches.
IT 1.8.4 Understand privacy concerns (social media, online banking, passwords, confidential information). (3A-IC-29) (3A-IC-30)
IT 1.8.5 Compare various security measures, considering tradeoffs between the usability and security of a computer system. (3A-NI-06)
IT 1.8.6 Explain tradeoffs when selecting and implementing cybersecurity recommendations. (3A-NI-07) (3A-NI-08)
IT 1.8.7 Compare ways software developers protect devices and information from unauthorized access. (3B-NI-04)
<b>IT 1.9 Understand basic software applications</b>

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<b>Measurement Criteria:</b>
IT 1.9.1 Demonstrate operation of e-mail, word processing, spreadsheets, presentation software, and database application software.
IT 1.9.2 Show working knowledge of collaborative tools and online resources.
IT 1.9.3 Demonstrate a working knowledge of different search engines.
<b>Cluster Topic 2: IT 2 Core-Technical Skills</b>
IT 2 Core-Technical Skills Cluster Knowledge and Skill Statement: <b>Understand the basic skills necessary to work in the IT industry.</b>
<b>Performance Elements:</b>
<b>IT 2.1 Demonstrate an understanding of the role and functions of an operating system.</b>
<b>Measurement Criteria:</b>
IT 2.1.1 Demonstrate the understanding of directory structures (folders, files, etc.).
IT 2.1.2 Demonstrate an understanding how to configure devices.
IT 2.1.3 Understand the roles of users in an operating system.
IT 2.1.4 Demonstrate knowledge of the different types of operating systems (e.g. Windows, Apple, Linux, IOS, Android, Chrome). (3B-CS-01)
IT 2.1.5 Describe the difference between applications and operating systems and how the dependencies of each work.
IT 2.1.6 Evaluate the scalability and reliability of networks by describing the relationship between routers, switches, servers, topology, and addressing network functionality. (3A-NI-04) (CB-NI-03)
IT 2.1.7 Translate between different bit representations of real-world phenomena, such as characters, numbers and images. (3A-DA-09)
IT 2.1.8 Evaluate the tradeoffs in how data elements are organized and where data is stored. (3A-DA-10)
<b>IT 2.2 Use logic to solve problems and demonstrate trouble-shooting skills. (3A-CS-03)</b>
<b>Measurement Criteria:</b>
IT 2.2.1 Develop a plan to troubleshoot an identified technical issue.
IT 2.2.2 Demonstrate initiative to independently solve problems and trouble-shoot.
IT 2.2.3 Understand the resources available to troubleshoot an issue.
IT 2.2.4 Demonstrate the ability to obtain information from a user to identify the root cause of an issue.
IT 2.2.5 Implement steps to prevent the issue from happening in the future.
<b>IT 2.3 Demonstrate knowledge of the hardware components associated with Information Systems. (3A-CS-02)</b>
<b>Measurement Criteria:</b>
IT 2.3.1 Demonstrate a knowledge of the difference between hardware and software.

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IT 2.3.2 Compare and contrast the difference between a virtual machine and a physical machine.
IT 2.3.3 Define the different components of a computing device (CPU, memory, hard drive).
IT 2.3.4 Identify common peripherals (printers, cameras, back-up devices, scanners).
IT 2.3.5 Discuss the basic elements of cloud computing.
IT 2.3.6 Demonstrate the ability to create a virtual machine (VMWare, Xen).
<b>IT 2.4 Demonstrate math skills.</b>
<b>Measurement Criteria:</b>
IT 2.4.1 Demonstrate the relationship between different numbering systems (binary, decimal, hex).
IT 2.4.2 Demonstrate the ability to use a spreadsheet to create formulas and graphical representations of the data.
<b>IT 2.5 Demonstrate the ability to use technical documents.</b>
<b>Measurement Criteria:</b>
IT 2.5.1 Demonstrate the ability to use the internet to research and find answers to technical issues.
IT 2.5.2 Assess the reliability of online documentation.
IT 2.5.3 Demonstrate the working knowledge of a flow chart or decision tree documentation.
IT 2.5.4 Evaluate the ability of models and simulations to test and support and make predictions on selected processes to test the hypotheses. (3A-DA-12)
IT 2.5.5 Use data sets to support a claim or communicate information. (3B-DA-06)
IT 2.5.6 Use tools to identify patterns in data representing complex systems. (3A-DA-10) (3B- DA-05) (3B-AP-15)
<b>IT 2.6 Demonstrate the basic design process of a project.</b>
<b>Measurement Criteria:</b>
IT 2.6.1 Create a prototype that uses algorithms to solve computational problems by leveraging prior student knowledge and personal interests. (3A-AP-13)
IT 2.6.2 With a team, design, and develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions and with working as a team. (3A-AP-16) (3A-AP-18) (3A-AP-22)
IT 2.6.3 Use lists to simplify solutions, generalizing computational problems instead of repeatedly using simple variables. (3A-AP-14)
IT 2.6.4 Demonstrate the function and purpose of the project you are designing using constructs such as procedures, modules, and/or objects. (3A-AP-17) (3B-AP-14)
IT 2.6.5 Evaluate and refine computational artifacts to make them more usable and accessible. (3A-AP-21)
IT 2.6.6 Document design decisions using text, graphics, presentations, and/or demonstration in the development of complex programs. (3A-AP-23)
IT 2.6.7 Demonstrate the ability to describe the business requirements and how the solution satisfies the

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business theme and how it could possibly be used in other disciplines.
IT 2.6.8 Describe a methodology of testing your project. (3B-DA-07)
IT 2.6.9 Describe how improvements or user feedback would be incorporated in the project.
IT 2.6.10 Understand the unique needs of accessibility to all users.
<b>IT 2.7 Understand computational systems.</b>
<b>Measurement Criteria:</b>
IT 2.7.1 Understand the integration of a computer system within other devices and discuss how they work together.
<b>IT 2.8 Utilize algorithms to understand computer programming and processes.</b>
<b>Measurement Criteria:</b>
IT 2.8.1 Illustrate the flow of execution of a recursive algorithm.
IT 2.8.2 Construct solutions to problems using student-created components such as procedures, modules and or objects.
IT 2.8.3 Demonstrate code reuse by creating programming solutions using libraries and APIs. (3B-AP-16)
IT 2.8.4 Justify the selection of specific control structures when tradeoffs involve implementation, readability, and program performance, and explain the benefits and drawbacks of choices. (3A-AP-15)
IT 2.8.5 Plan and develop programs for broad audiences using a software life cycle process. (3B- AP-17)
IT 2.8.6 Develop programs for multiple computing problems. (3B-AP-10) (3B-AP-19)
IT 2.8.7 Use version control systems, integrated development environment (IDEs), and collaborative tools and practices (code documentation) in a group software project. (3B- AP-20)
IT 2.8.8 Compare multiple programming languages and discuss how their features them suitable for solving different types of problems. (3A-IC-26) (3B-AP-24)
IT 2.8.9 Implement an artificial intelligence algorithm to play a game against a human opponent or solve a problem. (3B-AP-09)
IT 2.8.10 Evaluate algorithms in terms of their efficiency, correctness and clarity. (3B-AP-11)
IT 2.8.11 Compare and contrast fundamental data structures and their uses. (3B-AP-12)
IT 2.8.12 Illustrate the flow of execution of a recursive algorithm. (3B-AP-13)
<b>Cluster Topic: IT 3 Core-Communication Skills</b>
<b>IT 3 Core-Communication Skills Knowledge and Skill Statement: Understand concepts, strategies and methods needed to interact and collaborate with others.</b>
<b>Performance Elements:</b>
<b>IT 3.1 Understand customer interaction requirements.</b>
<b>Measurement Criteria:</b>
IT 3.1.1 Explain the importance of maintaining communication with the customer.

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IT 3.1.2 Identify customer expectations in a given situation.
IT 3.1.3 Create a basic requirements document and technical response document that addresses the user needs.
IT 3.1.4 Demonstrate the ability to prioritize tasks.
IT 3.1.5 Demonstrate the ability to plan according to people and resource needs and constraints and follow through to ensure you have met customer expectations.
<b>IT 3.2 Demonstrate the ability to communicate technical issues in a non-technical manner.</b>
<b>Measurement Criteria:</b>
IT 3.2.1 Create concise documentation and reports.
IT 3.2.2 Explain the importance of obtaining feedback from your audience and adjust presentation accordingly. (3A-AP-19)
IT 3.2.3 Describe a technical topic to a non-technical person.
<b>IT 3.3 Demonstrate ability to train users.</b>
<b>Measurement Criteria:</b>
IT 3.3.1 Understand the different learning styles of your audience.
IT 3.3.2 Identify user’s knowledge level and plan training accordingly.
IT 3.3.3 Demonstrate ability of how to use various technologies.
IT 3.3.4 Assess training outcomes.
<b>IT 3.4 Demonstrate the ability to work as a team member.</b>
<b>Measurement Criteria:</b>
IT 3.4.1 Offer contrasting viewpoints.
IT 3.4.2 Define and communicate workload limits.
IT 3.4.3 Understand the importance of communicating with others.
IT 3.4.4 Understand conflict resolution in a team setting.
IT 3.4.5 Understand cultural differences in communication. (3A-IC-27)
IT 3.4.6 Test and refine computational artifacts to reduce bias and equity deficits. (3A-IC-25) (3B-IC-25)(3B-IC-26)
IT 3.4.7 Predict how computational innovations that have revolutionized aspects of our culture might evolve. (3B-IC-27)
<b>IT 3.5 Demonstrate ability to communicate professionally both verbally in writing (e.g. resumes, cover letters, reports, interviews, e-mails).</b>
<b>Measurement Criteria:</b>
IT 3.5.1 Role play interviews for requirements gathering for a project.

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IT 3.5.2 Write a short report covering the issues, gathered requirements requiring solutions, with a cover letter asking for approval to proceed with the project, and resumes of team members participating in the project.
IT 3.5.3 Recognize when to or not to use an e-mail for communication.
IT 3.5.4 Demonstrate the ability to write a professional e-mail.

<b>Networking Systems</b>
<b>Cluster Topic 4: IT 4-Networking Systems Pathway</b>
<b>IT 4-Networking Systems Pathway Cluster Knowledge and Skill Statement: Use information technology tools specific to the career cluster to access, manage, integrate, and create information.</b>
<b>Performance Elements:</b>
<b>IT 4.1 Demonstrate an understanding of common operating systems used in the industry.</b>
<b>Measurement Criteria:</b>
IT 4.1.1 Understand the history of operating systems and their progression.
IT 4.1.2 Understand basic commands of different systems.
IT 4.1.3 Understand the types of software that runs on each operating system.
IT 4.1.4 Explain how the operating system should be configured to maximize performance. (3B-NI-03)
<b>IT 4.2 Use operating system principles to ensure optimal system function.</b>
<b>Measurement Criteria:</b>
IT 4.2.1 Apply basic commands of operating system software.
IT 4.2.2 Apply appropriate file and disk management techniques.
IT 4.2.3. Employ desktop operating skills.
IT 4.2.4 Handle materials and equipment in a responsible manner.
IT 4.2.5 Follow power-up and log-on procedures.
IT 4.2.6 Interact with/respond to system messages using console device.
IT 4.2.7 Run applications/jobs in accordance with processing procedures.
IT 4.2.8 Follow log-off and power-down procedure(s).
<b>IT 4.3 List network devices and functions (e.g. repeater, bridge, switch, router).</b>
<b>Measurement Criteria:</b>
IT 4.3.1 Define the difference between a router and a firewall.
IT 4.3.2 Define the difference between a hub and a switch.
IT 4.3.3 Define what a host intrusion prevention system does.
IT 4.3.4 Define what a network intrusion prevention system does.
IT 4.3.5 Define the difference between Intrusion Detection vs. Intrusion Prevention.
IT 4.3.6 Define the differences between a layer 2 and a layer 3 switch.
<b>IT 4.4 Identify types of networks and their capabilities (e.g. LAN, WAN, MAN, Wi-Fi).</b>
<b>Measurement Criteria:</b>
IT 4.4.1 Demonstrate understanding of types of networks deployed in a home, small office, office buildings, industrial settings, schools, college campus, multi-site organizations and the primary difference between each.

<b>Networking Systems</b>
IT 4.4.2 Demonstrate an understanding of the costs associated with each type of network and what drives the cost differences.
IT 4.4.3 Identify the different types of risks associated with each type of network.
<b>IT 4.5 Summarize basic data communications components and trends to maintain and update IT Systems.</b>
<b>Measurement Criteria:</b>
IT 4.5.1 Explain data communications procedures, equipment and media.
IT 4.5.1.a Demonstrate knowledge of key communications procedures.
IT 4.5.1.b Demonstrate knowledge of the uses of data communication equipment.
IT 4.5.1.c Demonstrate knowledge of types of communications media.
IT 4.5.2 Explain data transmission codes and protocols.
IT 4.5.2.a Demonstrate knowledge of data transmission codes and protocols.
IT 4.5.3 Explain the differences between local and wide area networks.
IT 4.5.3.a Distinguish between local area networks and wide-area networks.
IT 4.5.4 Summarize data communication trends and issues.
IT 4.5.4.a Identify data communication trends.
IT 4.5.4.b Identify major current issues in data communications.
<b>IT 4.6 Explain the importance of security of data (e.g. privacy of information, confidentiality, restricted use by authorized personnel).</b>
<b>Measurement Criteria:</b>
IT 4.6.1 Demonstrate an awareness of technological advances and availability of resources.
IT 4.6.2 Understand the need for confidentiality.
IT 4.6.3 Identify sources of security problems with data. (3B-AP-18)
IT 4.6.4 Identify methods of data protection.
IT 4.6.5 Understand the lifecycle of data protection (e.g. the creation of data, management of data, storage of data).
IT 4.6.6 Understanding the different methods to encrypt data (e.g. volume level encryption, file encryption, or database encryption).
<b>IT 4.7 Identify network topologies and protocols.</b>
<b>Measurement Criteria:</b>
IT 4.7.1 Demonstrate knowledge of the OSI layers 1, 2, and 3.
IT 4.7.2 Define what Internet Protocol is.
IT 4.7.3 Define what TCP is.
IT 4.7.4 Define what UDP is.
IT 4.7.5 Define what the different is between a switched network and a hub network.

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IT 4.7.6 Define what the difference is between Telnet and SSH.
IT 4.7.7 Define what the difference is between FTP and SFTP.
<b>IT 4.8 Identify and list networking media.</b>
<b>Measurement Criteria:</b>
IT 4.8.1 Define what an RJ 45 connection is.
IT 4.8.2 Define what a co-ax connection is.
IT 4.8.3 Define the differences between cat 5, 5E and 6.
IT 4.8.4 Define what a “point to point circuit” is and how that differs from the internet.
IT 4.8.5 Define what the difference is between WiFi and leased line circuits.
IT 4.8.6 Define the difference between WiFi and Satellite technology.
<b>IT 4.9 Demonstrate technical knowledge of the Internet to develop and maintain IT systems.</b>
<b>Measurement Criteria:</b>
IT 4.9.1 Describe Internet protocols.
IT 4.9.1.a Demonstrate knowledge of the Transmission Control Protocol/Internet Protocol (TCP/IP) suite.
IT 4.9.1.b Demonstrate knowledge of management protocols, applications and procedures (e.g., SNMP, intrusion detection, and reporting issues).
IT 4.9.1.c Explain the concept of routing.
IT 4.9.2 Demonstrate a basic understanding of Domain Name System(DNS).
<b>IT 4.10 Access and use Internet services when completing IT related tasks to service and update IT systems.</b>
<b>Measurement Criteria:</b>
IT 4.10.1 Demonstrate the use of an Internet connection.
IT 4.10.1.a Configure a small home office Internet connection using cable, DSL, wireless or satellite connection.
IT 4.10.1.b Test Internet connection using tools such as ping, trace route, net stat, host, dig, and DNS lookup.
IT 4.10.2 Troubleshoot Internet connection problems.
IT 4.10.3 Explain the functions of the Internet software components.
IT 4.10.3.a Demonstrate knowledge of the components of Internet software.
IT 4.10.4 Install Internet software for use on an operating system.
IT 4.10.4.a Identify common browser features.
IT 4.10.4.b Install Internet software.
IT 4.10.4.c Differentiate between Web-based applications and applications installed on a local computer.
IT 4.10.4.d Download software upgrades and shareware from the Internet.

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IT 4.10.4.e Unpack files using compression software.
IT 4.10.5 Describe virus protection procedures.
IT 4.10.5a Demonstrate acute awareness of virus protection techniques.
IT 4.10.5b Identify types and capabilities of popular virus protection software.
IT 4.10.5c Explain spyware, adware, and malware.
IT 4.10.5d Identify how to avoid spyware, adware, and malware and how to recover from infection.
IT 4.10.6 Explain cookies and adware on an Internet connected computer system.
IT 4.10.6.a Demonstrate knowledge of cookies and their use on an internet-connected computer system.
IT 4.10.6.b Identify types and consequences of pop-ups and adware.
<b>IT 4.11 Install and configure software programs to maintain and update IT systems.</b>
<b>Measurement Criteria:</b>
IT 4.11.1 Verify that software to be installed is licensed prior to performing installation.
IT 4.11.1.a Verify conformance to licensing agreement.
IT 4.11.1.b Understand the concept of an End User License Agreement (EULA).
IT 4.11.1.c Differentiate between open source and proprietary licenses.
IT 4.11.1.d Explain the concept of open source.
IT 4.11.1.e Identify common characteristics of open source licensing agreements, including the GNU General Public License (GPL).
<b>IT 4.12 Recognize and analyze potential IT security threats to develop and maintain security Requirements.</b>
<b>Measurement Criteria:</b>
IT 4.12.1 Describe potential security threats to information systems.
IT 4.12.2 Identify the range of security needs and the problems that can occur due to security lapses.
IT 4.12.3 Assess security threats.
IT 4.12.3.a Maximize threat reduction.
IT 4.12.3.b Assess exposure to security issues.
IT 4.12.3.c Implement countermeasures.
IT 4.12.3.d Ensure compliance with security rules, regulations, and codes.
IT 4.12.3.e Demonstrate knowledge of virus protection strategy.
IT 4.12.3.f Implement security procedures in accordance with business ethics.
IT 4.12.4 Develop plans to address security threats.
IT 4.12.5 Implement plans to address security procedures.
IT 4.12.5.a Maintain confidentiality.
IT 4.12.5.b Load virus detection and protection software.
IT 4.12.5.c Identify sources of virus infections.
IT 4.12.5.d Remove viruses.
IT 4.12.5.e Report viruses in compliance with company standards.
IT 4.12.5.f Implement backup and recovery procedures.
IT 4.12.5.g Follow disaster plan.
IT 4.12.5.h Provide for user authentication and restricted access (e.g., assign passwords, access level).

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(3B-NI-04)

<b>Programming and Software Development</b>
<b>IT Cluster Topic 5: IT 5-Programming and Software Development Pathway</b>
<b>IT 5 Programming and Software Development Pathway Knowledge and Skill Statement: Understand the concept of design, development, implementation, and maintenance of computer software.</b>
<b>Performance Elements:</b>
<b>IT 5.1 Demonstrate a fundamental understanding of programming.</b>
<b>Measurement Criteria:</b>
IT 5.1.1 Write a small modular program using variables.
IT 5.1.2 Describe a class and objects.
IT 5.1.3 Describe the key differences between procedural programming, object-oriented programming, event driven programming and functional programming.
IT 5.1.4 List the key differences between a Waterfall life cycle and an Agile lifecycle.
<b>IT 5.2 Demonstrate the ability to design an application.</b>
<b>Measurement Criteria:</b>
IT 5.2.1 Gather data to identify customer requirements.
IT 5.2.2 Design a process map to illustrate a decision flow end to end.
IT 5.2.3 Demonstrate the ability to storyboard a user experience of the application.
<b>IT 5.3 Demonstrate an understanding of how to create and develop software.</b>
<b>Measurement Criteria:</b>
IT 5.3.1 Demonstrate the ability to code a program/application.
IT 5.3.2 Understand the difference between development, quality assurance and production.
IT 5.3.3 Demonstrate the ability to develop documentation and incorporate comments within the code.
IT 5.3.4 Develop a minimum viable product to obtain end-user feedback.
IT 5.3.5 Use Peer Review to assess application code.
<b>IT 5.4 Demonstrate the ability to test an application for functionality.</b>
<b>Measurement Criteria:</b>
IT 5.4.1 Demonstrate the ability to edit for any invalid data/input.
IT 5.4.2 Demonstrate an application/program will successfully with both valid and invalid data/input. (CB-CS-02)
IT 5.4.3 Demonstrate the ability of the application to recover after invalid data has been input or processed (exception testing).
IT 5.4.4 Explain the development of test data necessary to run tests on software.
IT 5.4.5 Apply test data to program code.
IT 5.4.6 Demonstrate knowledge of user acceptance testing.
IT 5.4.7 Develop end-user training plan and documentation.
<b>IT 5.5 Understand the concepts regarding secure application design.</b>
<b>Measurement Criteria:</b>
IT 5.5.1 Research programming standards (i.e. OWASP).
IT 5.5.1 Demonstrate knowledge of SQL injections.

<b>Programming and Software Development</b>
IT 5.5.3 Demonstrate knowledge of cross-site scripting (XSS).
IT 5.5.4 Demonstrate knowledge of how to intercept, capture and change HTML pages.
<b>IT 5.6 Understand the concepts of version and change control.</b>
<b>Measurement Criteria:</b>
IT 5.6.1 Demonstrate an understanding of Change Management.
IT 5.5.2 Research tools that are available to assist with version control and repositories.
<b>IT 5.7 Understand the concepts of future improvements and upgrades to software.</b>
<b>Measurement Criteria:</b>
IT 5.7.1 Prioritize change requests.
IT 5.7.2 Explain the risks and benefits of incorporating changes into the existing codebase.
IT 5.7.3 Develop a plan for ongoing maintenance and support.

<b>Information Support and Services</b>
<b>IT Cluster Topic 6: IT 6-Information Support and Services Pathway</b>
<b>IT 6 Information Support and Services Pathway Cluster Knowledge and Skill Statement: Understand hardware and software support issues that affect the company.</b>
<b>Performance Elements:</b>
<b>IT 6.1 Explain the cost of implementing day-to-day information support and services operations and how it affects the company's bottom-line.</b>
<b>Measurement Criteria:</b>
IT 6.1.1 Estimate the cost to run a small help desk with 3 employees for a year.
IT 6.1.2 Design a help desk service in your local school and support costs associated with the start-up of a help desk.
IT 6.1.3 Observe an existing help desk in the community or online.
IT 6.1.4 Evaluate the current help desk service provided in the district.
<b>IT 6.2 Explain the importance of backing up data and maintaining data integrity.</b>
<b>Measurement Criteria:</b>
IT 6.2.1 Identify possible sources of data lost.
IT 6.2.2 Identify methods and technologies for preserving data.
IT 6.2.3 List the steps required for effective backup and recovery.
IT 6.2.4 Design a recovery plan for what happens if there is a disaster and how you would get everything back up and running.
<b>IT 6.3 Understand how changes that are made in one part of the system affects the others.</b>
<b>Measurement Criteria:</b>
IT 6.3.1 Explain the importance of preserving the privacy of data.
IT 6.3.2 Predict how changes to one area might impact another area.
IT 6.3.3 Understand the concept of regression testing.
<b>IT 6.4 Explain the importance of security of data (e.g. privacy of information, confidentiality, encryption, and restricted access by authorized personnel).</b>
<b>Measurement Criteria:</b>

<b>Information Support and Services</b>
IT 6.4.1 Demonstrate an awareness of technological advances in securing data.
IT 6.4.2 Understand the requirement for confidentiality.
IT 6.4.3 Identify methods of data protection.
IT 6.4.4 Understand the importance of user roles.
IT 6.4.5 Explain the difference between Admin and non-Admin roles.
<b>IT 6.5 Understand best practices in regards to cyber security.</b>
<b>Measurement Criteria:</b>
IT 6.5.1 Explain why hacks happen.
IT 6.5.2 Understand the consequences of Cyber Security breaches.
IT 6.5.3 Understand the tools available to minimize the risks for Cyber Security breaches.
IT 6.5.4 Explain a process that could be used in response to a breach.
<b>IT 6.6 Be able to install and support applications commonly used in the district.</b>
<b>Measurement Criteria:</b>
IT 6.6.1 Understand how to properly install applications.
IT 6.6.2 Understand the difference between network installations and local installations.
IT 6.6.3 Understand Cloud based applications and how they differ from local applications.
<b>IT 6.7 Demonstrate effective customer services skills (e.g., patience, courtesy, identify customer expectations, promptness).</b>
<b>Measurement Criteria:</b>
IT 6.7.1 Role play customer help-desk scenarios.
IT 6.7.2 Understand the importance of a positive attitude.
IT 6.7.3 Understand the different types of personalities and how to communicate with each.
IT 6.7.4 Explore the support ticket systems available for use by help desks.
IT 6.7.5 Demonstrate a conflict-resolution strategy to de-escalate an unsatisfied customer.
<b>IT 6.8 Demonstrate the ability to convey information regarding technical material (non-technical explanations for technical terms).</b>
<b>Measurement Criteria:</b>
IT 6.8.1 Explain clearly the instructions for a computer task to another individual.
IT 6.8.2 Conduct task specific training and coach others to apply related concepts.
IT 6.8.3 Demonstrate ability to train others to use common applications.
IT 6.8.4 Demonstrate ability to document a process or solution.

<b>Web and Digital Communications: Web Design</b>
<b>Cluster Topic 7: IT 7-Web and Digital Communications Sub Topic: Web Design</b>
<b>IT 7-1 Web and Digital Communications/Web Design Pathway - Knowledge and Skill Statement: Iterate through the design and development process to create a uniform Web/digital product.</b>
<b>Performance Elements:</b>
<b>IT 7-1.1 Participate in iterative development with clients and team members.</b>
<b>Measurement Criteria:</b>
IT 7-1.1.1 Manage the change control process.
IT 7-1.1.2 Identify and track critical milestones.
IT 7-1.1.3 Report project status.
IT 7-1.1.4 Identify optimal strategies for successful interactions with clients and team members.
<b>IT 7-2 Web and Digital Communications/Web Design Pathway - Cluster Knowledge and Skill Statement: Participate in a user focused design and development process to produce Web and digital communications solutions.</b>
<b>Performance Elements:</b>
<b>IT 7-2.1 Analyze Usability and Accessibility as it pertains to customer needs.</b>
<b>Measurement Criteria:</b>
IT 7-2.1.1 Demonstrate knowledge of 508 ADA Compliance.
IT 7-2.1.2 Demonstrate knowledge of web metrics and governance (policies and stylebooks).
IT 7-2.1.3 Demonstrate knowledge of cultural implications on design and deployment of digital communication products.
IT 7-2.1.4 Engage in user testing throughout the design and development process. (3B-AP-21)
<b>IT 7-3 Web and Digital Communications/Web Design Pathway - Cluster Knowledge and Skill Statement: Design and employ the use of graphics to create a visual Web/digital design.</b>
<b>Performance Elements:</b>
<b>IT 7-3.1 Implement functional design criteria.</b>
<b>Measurement Criteria:</b>
IT 7-3.1.1 Identify, utilize and create reusable components.
IT 7-3.1.2 Create and produce content.
IT 7-3.1.3 Create and refine design concepts.
<b>IT 7-3.2 Create product visual design.</b>
<b>Measurement Criteria:</b>
IT 7-3.2.1 Apply principles and elements of design.
IT 7-3.2.2 Apply color theory to select appropriate colors.
IT 7-3.2.3 Create and/or implement the look and feel of the product.
IT 7-3.2.4 Create graphical images and videos.
IT 7-3.2.5 Apply knowledge of typography.
IT 7-3.2.6 Alter digitized images using an image manipulation program.
IT 7-3.2.7 Evaluate visual appeal.
<b>IT 7-4 Web and Digital Communications/Web Design Pathway - Cluster Knowledge and Skill Statement: Gather and analyze digital communication customer requirements to best meet consumer needs.</b>
<b>Performance Elements:</b>
<b>IT 7-4.1 Gather data to identify customer requirements.</b>

<b>Web and Digital Communications: Web Design</b>
<b>Measurement Criteria:</b>
IT 7-4.1.1 Gather information using interviewing strategies.
IT 7-4.1.2 Determine client’s needs and expected outcomes.
<b>IT 7-4.2 Collect requirements data from customers and competing Web sites.</b>
<b>Measurement Criteria:</b>
IT 7-4.2.1 Determine purpose of the digital communication project.
IT 7-4.2.2 Determine the target audience.
IT 7-4.2.3 Determine the digital communication elements to be used.
IT 7-4.2.4 Determine client’s privacy policy and expectations.
<b>IT 7-4.3 Evaluate requirements data that has been collected.</b>
<b>IT 7-4.4 Demonstrate how to create and receive approval for a Web Site Plan.</b>
<b>IT 7-4. 5 Convey technical concepts from Web design to non-technical audience.</b>
<b>IT 7-5 Web and Digital Communications/Web Design Pathway - Cluster Knowledge and Skill Statement: Define the scope of digital communication work in a written form to summarize and meet customer requirements.</b>
<b>Performance Elements:</b>
<b>IT 7-5.1 Define scope of work to meet customer requirements.</b>
<b>Measurement Criteria:</b>
IT 7-5.1.1 Develop a design brief.
IT 7-5.1.2 Determine the target audience requirements (such as web accessibility).
IT 7-5.1.3 Identify available media and content sources.
IT 7-5.1.4 Develop timeline for completion.
IT 7-5.1.5 Determine staffing resources – internal and external – required to complete project.
IT 7-5.1.6 Develop preliminary project budget.
IT 7-5.1.7 Write scope of work document.
IT 7-5.1.8 Obtain client approval on scope of work.
<b>IT 7-6 Web and Digital Communications/Web Design Pathway - Cluster Knowledge and Skill Statement: Prepare digital communication product specifications to communicate specifications with various audiences.</b>
<b>Performance Elements:</b>
<b>IT 7-6.1 Prepare functional specifications.</b>
<b>Measurement Criteria:</b>
IT 7-6.1.1 Develop flowchart/navigational blueprints.
IT 7-6.1.2 Develop storyboards.
IT 7-6.1.3 Determine delivery platform(s).
IT 7-6.1.4 Design user interface.
IT 7-6.1.5 Design navigational schema.

<b>Web and Digital Communications: Web Design</b>
<b>IT 7-6.2 Prepare visual design specifications.</b>
<b>Measurement Criteria:</b>
IT 7-6.2.1 Apply principles of design (color theory and schemes, proximity, alignment, repetition, web graphics, optimization, typography).
IT 7-6.2.2 Identify technical constraints.
IT 7-6.2.3 Create sample design showing placement of content, buttons, graphics and suggested color Scheme.
<b>IT 7-6.3 Create final project plan.</b>
<b>Measurement Criteria:</b>
IT 7-6-3.1 Identify and obtain tools and resources to do the job.
IT 7-6-3.2 Identify and evaluate risks.
IT 7-6-3.3 Develop detailed task list.
IT 7-6-3.4 Identify critical milestones.
IT 7-6-3.5 Identify interdependencies.
<b>IT 7-7 Web and Digital Communications/Web Design Pathway - Cluster Knowledge and Skill Statement: Demonstrate the effective use of tools for digital communication production, development and project management to complete web/digital communication projects.</b>
<b>Performance Elements:</b>
<b>IT 7-7.3 Select and use appropriate software tools.</b>
<b>Measurement Criteria:</b>
IT 7-7.3.1 Demonstrate proficiency in use of digital imaging, digital video techniques, and equipment.
IT 7-7.3.2 Demonstrate knowledge of available graphics, video, motion graphics, web software programs.
IT 7-7.3.3 Demonstrate knowledge of available project management and collaborative tools.
IT 7-7.3.4 Demonstrate knowledge of integrated development environments.
IT 7-7.3.5 Demonstrate use of image altering software.
IT 7-7.3.6 Identify how different user agents (browsers, devices) affect the digital communication product.
<b>IT 7-8 Web and Digital Communications/Web Design Pathway - Cluster Knowledge and Skill Statement: Employ knowledge of Web design, programming, and administration to develop and maintain Web applications.</b>
<b>Performance Elements:</b>
<b>IT 7-8.1 Implement functional design criteria.</b>
<b>Measurement Criteria:</b>
IT 7-8.1.1 Identify, utilize and create reusable components.
IT 7-8.1.2 Create and produce content.
IT 7-8.1.3 Create and refine design concepts.
<b>IT 7-8.2 Create product visual design.</b>
<b>Measurement Criteria:</b>
IT 7-8.2.1 Apply principles and elements of design.
IT 7-8.2.2 Apply color theory to select appropriate colors.

<b>Web and Digital Communications: Web Design</b>
IT 7-8.2.3 Create and/or implement the look and feel of the product.
IT 7-8.2.4 Create graphical images and/or video elements.
IT 7-8.2.5 Apply knowledge of typography.
IT 7-8.2.6 Alter digitized images using an image manipulation program.
IT 7-8.2.7 Evaluate visual appeal.
<b>IT 7-8.3 Use basic Web development skills.</b>
<b>Measurement Criteria:</b>
IT 7-8.3.1 Demonstrate knowledge of HTM, HTML and CSS.
IT 7-8.3.2 Demonstrate knowledge of version control and why it is important.
IT 7-8.3.3 Demonstrate knowledge of basic web application security.
IT 7-8.3.4 Demonstrate that website meets the validation process and is compatible across multiple browsers and devices.
<b>IT 7-8.4 Summarize Internet architecture elements.</b>
<b>Measurement Criteria:</b>
IT 7-8.4.1 Demonstrate knowledge of transfer protocols (FTP, WebDAV).
IT 7-8.4.2 Demonstrate knowledge of Internet standards bodies.
IT 7-8.4.3 Keep up-to-date with new and emerging trends related to the Internet.
<b>IT 7-8.5 Employ basic web programming knowledge.</b>
<b>Measurement Criteria:</b>
IT 7-8.5.1 Demonstrate knowledge of client-side processing and its advantages/disadvantages.
IT 7-8.5.2 Identify standards scripting languages such as JavaScript.
IT 7-8.5.3 Demonstrate knowledge of website testing.
IT 7-8.5.4 Demonstrate knowledge of the uses and advantages/disadvantages of various scripting Languages.
<b>IT 7-9 Web and Digital Communications/Web Design Pathway - Cluster Knowledge and Skill Statement: Test a digital communication product to evaluate its functionality.</b>
<b>Performance Elements:</b>
<b>IT 7-9.1 Develop a test plan for the digital communication product.</b>
<b>Measurement Criteria:</b>
IT 7-9.1.1 Perform usability tests.
IT 7-9.1.2 Modify an existing program to add additional functionality and discuss intended and unintended implications. (3B-AP-22)
IT 7-9.1.3 Assess product effectiveness.
IT 7-9.1.4 Test product for reliability using code review and other methods. (3B-AP-23)
IT 7-9.1.5 Plan and coordinate customer acceptance testing.
<b>IT 7-9.2 Implement a test plan for the digital communication product.</b>
<b>Measurement Criteria:</b>
IT 7-9.2.1 Define the problem.
IT 7-9.2.2 Identify/test possible solutions.
IT 7-9.2.3 Develop resolution plan.

<b>Web and Digital Communications: Web Design</b>
IT 7-9.2.4 Implement solution.
IT 7-9.2.5 Evaluate problem-solving processes and outcomes.
<b>IT 7-9.3 Resolve product problems.</b>
<b>IT 7-10 Web and Digital Communications/Web Design Pathway - Cluster Knowledge and Skill Statement: consider intellectual property issues when creating Web pages.</b>
<b>Performance Elements:</b>
IT 7-10.1 Explain the concept of intellectual property.
IT 7-10.2 Differentiate between copyright and trademarks.
IT 7-10.3 Describe the function of non-disclosure agreement(NDA).

<b>Web and Digital Communications: Graphic Design</b>
<b>IT Cluster Topic 8: IT 8-Web and Digital Communications Sub Topic: Graphic Design</b>
<b>IT 8-1 Web and Digital Communications/Graphic Design - Cluster Knowledge and Skill Statement: Demonstrate knowledge of the Graphics Industry.</b>
<b>Performance Elements:</b>
<b>IT 8-1.1 Demonstrate knowledge of the history of the graphic design field.</b>
<b>Measurement Criteria:</b>
IT 8-1.1.1 Research technologies that advanced graphic design.
IT 8-1.1.2 Describe past, present, and future styles in the graphic design field.
IT 8-1.1.3 Identify art movements that impacted graphic arts.
IT 8-1.1.4 Describe the importance of graphic design’s influence on society.
IT 8-1.1.5 Identify factors that contribute to the success of media businesses and freelance/contract providers.
IT 8-1.1.6 Examine how the relationship among marketing, sales and production affects profitability.
<b>IT 8-1.2 Communicate ideas using appropriate industry terminology.</b>
<b>Measurement Criteria:</b>
IT 8-1.2.1 Formulate written and verbal communications using industry standard terms.
IT 8-1.2.2 Prepare and deliver a visual presentation utilizing appropriate Cluster Knowledge.
<b>IT 8-2 Web and Digital Communications/Graphic Design - Cluster Knowledge and Skill Statement: Apply elements and principles of design to communicate visually.</b>
<b>Performance Elements:</b>
<b>IT 8-2.1 Utilize computer applications to manage media.</b>
<b>Measurement Criteria:</b>
IT 8-2.1.1 Use appropriate electronic publishing software and output devices.
IT 8-2.1.2 Apply essential commands and knowledge of computer operating systems.
IT 8-2.1.3 Apply computer file management techniques.
IT 8-2.1.4 Use the internet for file transfer.
IT 8-2.1.5 Select the format for digital delivery.
IT 8-2.1.6 Use and care for equipment and related accessories.
IT 8-2.1.7 Describe the functionality of the internet, intranet, and extranet in the media environment.
IT 8-2.1.8 Explain methods of protecting a computer against computer threats.

<b>Web and Digital Communications: Graphic Design</b>
<b>IT 8-2.2 Apply knowledge of data capture and manipulation.</b>
<b>Measurement Criteria:</b>
IT 8-2.2.1 Identify software that supports data capture for media devices (i.e. digital camera, video input device, graphics tablet, graphics expansion boards).
IT 8-2.2.2 Select appropriate resolutions for data capture.
IT 8-2.2.3 Capture and transfer still image, audio, and moving image content.
IT 8-2.2.4 Archive and manage data for media applications.
<b>IT 8-2.3 Identify and apply the elements of design.</b>
<b>Measurement Criteria:</b>
IT 8-2.3.1 Identify the applications of color, line, shape, texture, size, and value in samples of graphic work.
IT 8-2.3.2 Analyze the use of color, line, shape, texture, size and value in samples of graphic work.
IT 8-2.3.3 Incorporate color, line, shape, texture, size and value in student-generated graphic work.
IT 8-2.3.4 Demonstrate the elements of design through manual sketching.
IT 8-2.3.5 Demonstrate the elements of design through digital sketching.
<b>IT 8-2.4 Identify and apply the principles of design.</b>
<b>Measurement Criteria:</b>
IT 8-2.4.1 Analyze the principles of balance, contrast alignment, rhythm, repetition, movement, harmony, emphasis, and unity in samples of graphic works.
IT 8-2.4.2 Incorporate principles of balance, contrast, alignment, rhythm, repetition, movement, harmony, emphasis and unity in student-generated graphic works.
IT 8-2.4.3 Demonstrate the principles of design through various drawing techniques.
<b>IT 8-2.5 Identify and apply the principles of typography.</b>
<b>Measurement Criteria:</b>
IT 8-2.5.1 Identify the anatomical components and qualities of type (i.e., x-height, ascenders, descenders, counters, etc.).
IT 8-2.5.2 Apply and adjust formatting to type.
IT 8-2.5.3 Construct graphic works utilizing and manipulating type.
<b>IT 8-2.6 Apply principles and elements of design to layout.</b>
<b>Measurement Criteria:</b>
IT 8-2.6.1 Apply effective use of negative space, composition, message structure, graphics, etc. to graphic works.
IT 8-2.6.2 Create graphic works utilizing grids.
IT 8-2.6.3 Create graphic works utilizing templates.
IT 8-2.6.4 Demonstrate layout skills for print collaterals (i.e. business cards, newspapers, packaging, etc.).
IT 8-2.6.5 Demonstrate layout skills for digital media.
IT 8-2.6.6 Explain the importance of consistency of design.
IT 8-2.6.7 Explain the importance of usability.
IT 8-2.6.8 Explain the importance of core messaging.
IT 8-2.6.9 Apply measurement tools and ratio analysis to image positioning in graphic works.
IT 8-2.6.10 Solve aspect ratio proportion measurement in video and animation development.
<b>IT 8-3 Web and Digital Communications/Graphic Design - Cluster Knowledge and Skill Statement: Demonstrate knowledge of the key aspects of production using industry standard software.</b>

<b>Web and Digital Communications: Graphic Design</b>
<b>Performance Elements:</b>
<b>IT 8-3.1 Demonstrate knowledge of concept development.</b>
<b>Measurement Criteria:</b>
IT 8-3.1.1 Generate project ideas through the use of thumbnails, roughs, mock-ups, wireframes, etc.
IT 8-3.1.2 Create a storyboard for a project.
<b>IT 8-3.2 Demonstrate knowledge of image creation and manipulation.</b>
<b>Measurement Criteria:</b>
IT 8-3.2.1 Analyze differences and appropriate applications of vector-based and bitmap images.
IT 8-3.2.2 Use a variety of input devices to import photos, images, and other content.
IT 8-3.2.3 Incorporate the use of image manipulation and illustration software into final products.
IT 8-3.2.4 Apply nondestructive image editing techniques such as layering and masking.
IT 8-3.2.5 Practice using different selection tools and techniques to manipulate images.
IT 8-3.2.6 Practice in-camera composition and cropping.
<b>IT 8-3.3 Demonstrate applications of media outputs.</b>
<b>Measurement Criteria:</b>
IT 8-3.3.1 Use appropriate resolution, compression, and file formats for various media outputs including web, video, and print.
IT 8-3.3.2 Incorporate appropriate color modes in graphic works including but not limited to RGB and CMYK.
<b>IT 8-3.4 Demonstrate knowledge of the graphic design workflow to increase success and productivity.</b>
<b>Measurement Criteria:</b>
IT 8-3.4.1 Develop a workflow for a project.
IT 8-3.4.2 Synthesize information collected from communications with various stakeholders.
IT 8-3.4.3 Describe project management.
IT 8-3.4.4 Create projects that define core message.
IT 8-3.4.5 Work in a team to plan a larger project.
IT 8-3.4.6 Identify the target audience for a project.
<b>IT 8-3.5 Identify and apply the design process.</b>
<b>Measurement Criteria:</b>
IT 8-3.5.1 Explain the design process.
IT 8-3.5.2 Apply the design process to generate graphic works.
<b>IT 8-3.6 Demonstrate knowledge of branding and corporate identity.</b>
<b>Measurement Criteria:</b>
IT 8-3.6.1 Analyze branding and corporate identity, its purpose and constituents.
IT 8-3.6.2 Create a visual that contains all the richness of the brand.
<b>IT 8-4 Web and Digital Communications/Graphic Design - Cluster Knowledge and Skill Statement: Demonstrate knowledge of ethical and legal issues related to graphic design.</b>
<b>Performance Elements:</b>
<b>IT 8-4.1 Demonstrate knowledge of copyright and intellectual property law.</b>
<b>Measurement Criteria:</b>
IT 8-4.1.1 Research laws governing copyright, intellectual property (including font usage, photography, illustration, audio and video rights), and software licensing.
IT 8-4.1.2 Research laws governing brand issues, trademark, and other proprietary rights).

<b>Web and Digital Communications: Graphic Design</b>
IT 8-4.1.3 Discuss consequences of violating copyright, privacy, and data security laws.
IT 8-4.1.4 Define and debate fair use including authorships, rights of use for work and likeness, and credit lines.
IT 8-4.1.5 Model fair use in production of graphic works.
IT 8-4.1.6 Describe how diversity (cultural, ethnic, multigenerational) and ethics affect the selection of projects and programs.
<b>Performance Elements:</b>
<b>IT 8-4.2 Demonstrate knowledge of ethical behavior as it relates to the industry.</b>
<b>Measurement Criteria:</b>
IT 8-4.2.1 Research and discuss censorship as it applies to the graphic design industry.
IT 8-4.2.2 Research the purpose of non-disclosure agreements (NDA).
IT 8-4.2.3 Incorporate cultural sensitivity and diversity awareness into the design process.
IT 8-4.2.4 Debate legal versus ethical behaviors.
IT 8-4.2.5 Incorporate ethical behaviors in graphic projects.
<b>IT 8-5 Web and Digital Communications/Graphic Design - Cluster Knowledge and Skill Statement: Create and maintain a personal portfolio.</b>
<b>Performance Elements:</b>
<b>IT 8-5.1 Create and maintain a personal portfolio.</b>
<b>Measurement Criteria:</b>
IT 8-5.1.1 Research and compare the various types of personal portfolios.
IT 8-5.1.2 Develop graphics portfolios that include traditional and digital works).
IT 8-5.1.3 Recognize that portfolios are dynamic and require maintenance.
<b>IT 8-5.2 Demonstrate the process of evaluating portfolios.</b>
<b>Measurement Criteria:</b>
IT 8-5.2.1 Conduct peer and self-evaluations using rubrics.
IT 8-5.2.2 Understand the elements of the critique process, including a respect for peer work and the ability to give and receive dispassionate criticism.

For additional information: <https://educateiowa.gov/documents/service-areas-business-marketing/2013/05/it-critical-standards-and-benchmarks>



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