



# Agriculture, Food, and Natural Resources Career Cluster

The Agriculture, Food, and Natural Resources (AFNR) career cluster focuses on the essential elements of life, food, water, land, and air. This career cluster includes occupations ranging from farmer, rancher, and veterinarian to geologist, land conservationist, and florist.

## Statewide Program of Study: Animal Science

The Animal Science program of study focuses on occupational and educational opportunities associated with the science, research, and business of animals and other living organisms. This program of study includes applying biology and life science to real-world life processes of animals and wildlife, either in laboratories or in the field, which could include a veterinary office, a farm or ranch, or any outdoor area harboring animal life. Students will research and analyze the growth and destruction of species and research or diagnose diseases and injuries of animals.



## Secondary Courses for High School Credit

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|----------------|--|
| <b>Level 1</b> | <ul style="list-style-type: none"> <li>Principles of Agriculture, Food, and Natural Resources</li> </ul>   |
| <b>Level 2</b> | <ul style="list-style-type: none"> <li>Small Animal Management</li> <li>Equine Science</li> </ul>  |
| <b>Level 3</b> | <ul style="list-style-type: none"> <li>Livestock Production</li> </ul>   |
| <b>Level 4</b> | <ul style="list-style-type: none"> <li>Advanced Animal Science</li> <li>Veterinary Medical Applications</li> <li>Veterinary Medical Applications + Agricultural Laboratory and Field Experience (GRCTC)</li> <li>Practicum in Agriculture, Food, and Natural Resources</li> <li>Veterinary Medical Applications Practicum in Agriculture, Food, and Natural Resources (GRCTC)</li> </ul> |

## Aligned Advanced Academic Courses

<b>AP or IB</b>	<ul style="list-style-type: none"> <li>AP Biology</li> <li>IB Biology SL</li> <li>IB Biology HL</li> </ul>
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Students should be advised to consider these course opportunities to enrich their preparation. AP or IB courses not listed under the Secondary Courses for High School Credit section of this framework document do not count towards concentrator/completer status for this program of study.

## Work-Based Learning and Expanded Learning Opportunities

<b>Work-Based Learning Activities</b>	<ul style="list-style-type: none"> <li>Shadow an animal scientist in a biology lab to learn about applying science to understand animals and wildlife</li> <li>Intern in a veterinary clinic, caring for animals and wildlife being treated in the clinic</li> </ul>
<b>Expanded Learning Opportunities</b>	<ul style="list-style-type: none"> <li>Participate in an FFA career, leadership, and speaking contest like an agriscience fair</li> <li>Attend an agricultural industry seminar</li> </ul>

## Aligned Industry-Based Certifications

- Certified Veterinary Assistant, Level I
- Elanco Fundamentals of Animal Science Certification
- Elanco Veterinary Medical Applications Certification



## Example Postsecondary Opportunities

### Apprenticeships

- Reproduction Technician

### Associate Degrees

- Biological and Physical Sciences
- Entomology

### Bachelor's Degrees

- Animal Science
- Zoology/Animal Biology

### Master's, Doctoral, and Professional Degrees

- Marine Sciences
- Biotechnology

### Additional Stackable IBCs/License

- Veterinarian
- Certified Veterinary Technician



## Example Aligned Occupations

### Veterinary Assistants and Laboratory Animal Caretakers

Median Wage: \$29,906  
Annual Openings: 1,348  
10-Year Growth: 24%

### Veterinary Technologists and Technicians

Median Wage: \$33,679  
Annual Openings: 1,217  
10-Year Growth: 24%

### Veterinarian

Median Wage: \$103,160  
Annual Openings: 347  
10-Year Growth: 26%

Data Source: TexasWages, Texas Workforce Commission. Retrieved 3/8/2024

For more information visit:

<https://tea.texas.gov/academics/college-career-and-military-prep/career-and-technical-education/programs-of-study-additional-resources>





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## Statewide Program of Study: Agricultural Technology and Mechanical Systems

The Agricultural Technology and Mechanical Systems program of study focuses on occupational and educational opportunities associated with applying engineering technology and biological science to agricultural problems related to power and machinery, electrification, structures, soil and water use, and processing agricultural products. This program of study includes diagnosing, repairing, or overhauling farm machinery and vehicles, such as tractors, harvesters, dairy equipment, and irrigation systems.



## Secondary Courses for High School Credit

Level 1	<ul style="list-style-type: none"> <li>Principles of Agriculture, Food, and Natural Resources</li> </ul>
Level 2	<ul style="list-style-type: none"> <li>Agricultural Mechanics and Metal Technologies</li> </ul>
Level 3	<ul style="list-style-type: none"> <li>Agricultural Structures Design and Fabrication</li> <li>Agricultural Power Systems + Agricultural Laboratory and Field Experience</li> </ul>
Level 4	<ul style="list-style-type: none"> <li>Agricultural Equipment Design and Fabrication</li> <li>Practicum in Agriculture, Food, and Natural Resources</li> </ul>

## Work-Based Learning and Expanded Learning Opportunities

Work-Based Learning Activities	<ul style="list-style-type: none"> <li>Participate in a farm mechanic apprenticeship at an equipment production company</li> <li>Intern at an equipment manufacturing facility working with agricultural engineers</li> </ul>
Expanded Learning Opportunities	<ul style="list-style-type: none"> <li>Participate in an FFA career, leadership, and speaking contest like an agriscience fair</li> <li>Participate in an agriculture robotics event</li> </ul>

## Aligned Industry-Based Certifications

- AWS Certified Welder
- AWS D1.1 Structural Steel
- AWS D9.1 Sheet Metal Welding
- Machining Measurement, Material, and Safety Level I
- NCCER Core



## Example Postsecondary Opportunities

### Apprenticeships

- Farm Equipment Mechanic I

### Associate Degrees

- Diesel Mechanics Technology
- Industrial Mechanics and Maintenance Technology

### Bachelor's Degrees

- Agricultural Engineering
- Agricultural Systems Management

### Master's, Doctoral, and Professional Degrees

- Agricultural Engineering
- Industrial Technology



## Example Aligned Occupations



### Farm Equipment Mechanics and Service Technicians

Median Wage: \$46,582  
Annual Openings: 326  
10-Year Growth: 23%

### Mobile Heavy Equipment Mechanics

Median Wage: \$57,943  
Annual Openings: 2,637  
10-Year Growth: 31%

### Farmers, Ranchers, and Other Agricultural Managers

Median Wage: \$65,490  
Annual Openings: 28,020  
10-Year Growth: 4%

Data Source: TexasWages, Texas Workforce Commission. Retrieved 3/8/2024.



For more information visit:

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## Statewide Program of Study: *Environmental and Natural Resources*

The Environmental and Natural Resources program of study focuses on occupational and educational opportunities associated with the research, design, and engineering of plans for prevention and control of environmental hazards. This program of study includes conducting research for the purpose of identifying, abating, or eliminating sources of pollutants or hazards that affect either the environment or the health of the population.



## Secondary Courses for High School Credit

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|----------------|--|
| <b>Level 1</b> | • Principles of Agriculture, Food, and Natural Resources |
| <b>Level 2</b> | • Wildlife, Fisheries, and Ecology Management            |
| <b>Level 3</b> | • Energy and Natural Resource Technology                 |
| <b>Level 4</b> | • Practicum in Agriculture, Food, and Natural Resources  |

## Aligned Advanced Academic Courses

AP or IB

AP Biology  
AP Environmental Science

*Students should be advised to consider these course opportunities to enrich their preparation. AP or IB courses not listed under the Secondary Courses for High School Credit section of this framework document do not count towards concentrator/completer status for this program of study.*

## Work-Based Learning and Expanded Learning Opportunities

### Work-Based Learning Activities

- Intern in an environmental services office in local government to learn about sanitation and waste management
- Participate in a water treatment plant operator apprenticeship at a local water management company

### Expanded Learning Opportunities

- Participate in an FFA career, leadership, and speaking contest like an agriscience fair
- Attend an agricultural industry seminar

## Aligned Industry-Based Certifications

- Ducks Unlimited Ecology Conservation and Management Certification



## Example Postsecondary Opportunities

### Apprenticeships

- Water Treatment Plant Operator

### Associate Degrees

- Environmental/Environmental Engineering Technology
- Water Quality and Wastewater Treatment Management and Recycling Technology

### Bachelor's Degrees

- Environmental Engineering
- Environmental Health

### Master's, Doctoral, and Professional Degrees

- Biology/Biological Sciences
- Ecology

### Additional Stackable IBCs/License

- Pesticide Dealer License



## Example Aligned Occupations

### *Environmental Engineering Technologists and Technicians*

Median Wage: \$48,124  
Annual Openings: 186  
10-Year Growth: 18%

### *Environmental Scientists and Specialists*

Median Wage: \$75,421  
Annual Openings: 731  
10-Year Growth: 25%

### *Environmental Engineers*

Median Wage: \$103,246  
Annual Openings: 316  
10-Year Growth: 18%

Data Source: TexasWages, Texas Workforce Commission. Retrieved 3/8/2024



For more information visit:

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## Statewide Program of Study: Plant Science

The Plant Science program of study focuses on occupational and educational opportunities associated with the science, research, and business of plants and other living organisms. This program of study includes the application of biology and life science to real-world life processes of plants and vegetation, either in laboratories or in the field.



## Secondary Courses for High School Credit

<b>Level 1</b>	<ul style="list-style-type: none"> <li>Principles of Agriculture, Food, and Natural Resources</li> </ul>
<b>Level 2</b>	<ul style="list-style-type: none"> <li>Landscape Design and Management</li> <li>Turf Grass Management</li> </ul>
<b>Level 3</b>	<ul style="list-style-type: none"> <li>Horticultural Science</li> <li>Floral Design</li> </ul>
<b>Level 4</b>	<ul style="list-style-type: none"> <li>Advanced Plant and Soil Science</li> <li>Advanced Floral Design</li> <li>Practicum in Agriculture, Food, and Natural Resources</li> </ul>

## Aligned Advanced Academic Courses

<b>AP or IB</b>	<ul style="list-style-type: none"> <li>AP Biology</li> <li>AP Environmental Science</li> <li>AP Chemistry</li> </ul>
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## Work-Based Learning and Expanded Learning Opportunities

<b>Work-Based Learning Activities</b>	<ul style="list-style-type: none"> <li>Work in a part-time job at a landscaping company to learn about production and management of plants.</li> <li>Intern at an agricultural research company, working alongside a biological technician to learn about application of biology to plant production</li> </ul>
<b>Expanded Learning Opportunities</b>	<ul style="list-style-type: none"> <li>Participate in an FFA career, leadership, and speaking contest like an agriscience fair</li> <li>Participate in an industry-related competition like an agriscience fair</li> </ul>

## Aligned Industry-Based Certifications

- Texas State Florists' Association Knowledge Based Floral Certification
- Texas State Florists' Association Level I Floral Certification
- Texas State Florists' Association Level II Floral Certification



## Example Postsecondary Opportunities

### Apprenticeships

- Horticulturist



### Associate Degrees

- Biology/Biological Sciences
- Biological and Physical Sciences

### Bachelor's Degrees

- Horticulture
- Plant Pathology/Phytopathology

### Master's, Doctoral, and Professional Degrees

- Plant Breeding
- Botany/Plant Biology



## Example Aligned Occupations

### **Pesticide Handlers, Sprayers, and Applicators, Vegetation**

Median Wage: \$46,153

Annual Openings: 205

10-Year Growth: 17%

### **Biological Technicians**

Median Wage: \$45,787

Annual Openings: 879

10-Year Growth: 14%

### **Farmers, Ranchers, and Other Agricultural Managers**

Median Wage: \$65,490

Annual Openings: 28,020

10-Year Growth: 4%

Data Source: TexasWages, Texas Workforce Commission. Retrieved 3/8/2024.



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