# CAPS Environmental Science and Animal Health

## UNIT 1: Ecology and Ecosystems

| ESSENTIAL QUESTION | BIG IDEAS |
|---|---|
| **How do interactions between organisms and their environment shape the structure, function, and resilience of ecosystems?** | ● **Interdependence and Connectivity:** how species interact with one another and with their abiotic surroundings, forming complex networks of relationships.<br>● **Biodiversity and Adaptation:** investigate patterns of biodiversity across different ecosystems and the factors influencing species distribution and abundance. |

## GUIDING QUESTIONS

- Content

    - How do biotic and abiotic factors interact to shape the structure and function of ecosystems?

    - What are the key components and processes of energy flow and nutrient cycling in ecosystems?

    - How do ecological interactions, such as competition, predation, and symbiosis, influence population dynamics and community structure?

- Process

    - How can students apply ecological principles and scientific inquiry to investigate real-world environmental issues and propose solutions?

    - How can students effectively communicate ecological concepts and findings to diverse audiences, including peers, stakeholders, and the general public?

- Reflective

    - How can students design and conduct field investigations to explore ecological

phenomena and collect relevant data?

Environmental Resources & Wildlife Science      Course No. 37506

BENCHMARK 1.1: OUR NATURAL RESOURCES

BENCHMARK 1.2: CLASSIFY NATURAL RESOURCES

BENCHMARK 2.6: ECOLOGICAL CONCEPTS AND PRINCIPLES

BENCHMARK 3.1: NATURAL RESOURCE PRODUCTS

BENCHMARK 4.1: MANAGE FIRES

BENCHMARK 4.2: PLANT AND WILDLIFE DISEASES

BENCHMARK 4.3: INSECT INFESTATIONS

BENCHMARK 5.1: COMMUNICATE TO THE PUBLIC

## KEY LEARNING EXPERIENCES

- Field Studies: Students can conduct advanced ecological sampling techniques, analyze biodiversity, and investigate ecosystem dynamics.
- Research Symposium: Have students conduct independent research projects on specific ecological topics of interest, culminating in a research symposium where they present their findings to their peers and possibly to experts in the field.
- Ecological Restoration Project Design: Task students with designing ecological restoration projects for degraded ecosystems in their community. They can develop restoration plans, identify native species for reintroduction, and propose strategies for habitat restoration and biodiversity conservation.
- Community Engagement and Advocacy: Encourage students to engage with their local community on environmental issues and advocate for ecosystem conservation. This could involve organizing educational events, participating in community clean-up efforts, or collaborating with local organizations on conservation projects.
- Capstone Project: Assign students a capstone project where they integrate knowledge from throughout the unit to address a real-world ecological challenge. This could involve developing a comprehensive ecosystem management plan, conducting an environmental impact assessment, or proposing innovative solutions to pressing ecological problems.

# CAPS Environmental Science and Animal Health

## UNIT 2:  Environmental Science and Sustainability

| ESSENTIAL QUESTION | BIG IDEAS |
|---|---|
| **How can society balance human needs with environmental protection to ensure long-term sustainability?** | <ul><li>**Interconnectedness of Environmental Systems**: understanding the interconnected nature of environmental systems and the impacts of human activities on natural processes.</li><li>**Sustainability and Resource Management**: principles of sustainable development, including the conservation of biodiversity.</li></ul> |

## GUIDING QUESTIONS

Content

- What are the principles and strategies of sustainability, and how can they be applied to address environmental challenges?
- How do human activities impact ecosystems, natural resources, and the Earth's climate system?

Process

- How can students critically analyze and evaluate scientific evidence related to environmental issues and sustainability solutions?
- How can students analyze the ethical and social implications of environmental decisions and sustainability actions?

Reflective

- What are the broader implications of environmental science and sustainability for society, and how can individuals contribute to positive change in their communities and beyond?

Environmental Resources & Wildlife Science    Course No. 37506

BENCHMARK 3.1: NATURAL RESOURCE PRODUCTS

BENCHMARK 4.2: PLANT AND WILDLIFE DISEASES

BENCHMARK 5.1: COMMUNICATE TO THE PUBLIC

**KEY LEARNING EXPERIENCES**

- Debate on Environmental Ethics: Organize a debate or seminar discussing various perspectives on environmental ethics and their implications for ecosystem management. Students can explore ethical dilemmas related to conservation, resource use, and human-environment interactions.
- Policy Analysis: Engage students in analyzing environmental policies and their impact on ecosystems. They can research current environmental policies, evaluate their effectiveness, and propose recommendations for improving ecosystem conservation and management strategies.
- Ecosystem Service Assessment: Guide students in assessing ecosystem services provided by local ecosystems and their economic and ecological value. They can conduct surveys, interviews, and economic analyses to evaluate ecosystem services such as pollination, water purification, and carbon sequestration.

# CAPS Environmental Science and Animal Health

## UNIT 3: Research Methods and Experimental Design

| ESSENTIAL QUESTION | BIG IDEAS |
|---|---|
| **How can researchers effectively design and implement experiments in Environmental Science to generate reliable data and draw meaningful conclusions?** | <ul><li>**Principles of Experimental Design:** design experiments that minimize bias, maximize statistical power, and ensure the reliability and reproducibility of results.</li><li>**Techniques and Tools for Environmental Research:** hands-on experience with laboratory protocols and instrumentation.</li><li>**Data Analysis and Interpretation:** interpret experimental results, draw meaningful conclusions, and communicate findings effectively.</li></ul> |

## GUIDING QUESTIONS

- **Content**

    - How do researchers formulate testable hypotheses and design experiments to address specific research questions?

    - What are the key considerations in sample preparation, data collection, and data analysis?

    - How do researchers ensure the reliability, reproducibility, and ethical conduct of experiments?

- **Process**

    - How can students effectively analyze and interpret experimental data generated from biological experiments?

    - How can students evaluate the reliability, reproducibility, and validity of experimental findings in biological research?

- **Reflective**

- How do experiences with experimental design and data analysis in biology influenced student approach to problem-solving and scientific inquiry?

## FOCUS STANDARDS

Environmental Resources & Wildlife Science        Course No. 37506

BENCHMARK 2.2: CARTOGRAPHIC SKILLS

BENCHMARK 2.3: MEASURE AND SURVEY

BENCHMARK 2.4: ENHANCEMENT TECHNIQUES

BENCHMARK 2.5: INTERPRET LAWS

## KEY LEARNING EXPERIENCES

- **Case Study Analysis:** Present students with real-world case studies of biological research projects. Students analyze experimental design, data interpretation, and conclusions drawn by researchers. Encourage critical thinking and discussion about the strengths and limitations of different approaches.
- **Field Trip to Research Institution:** Organize a field trip to a local research institution or laboratory facility. Students observe scientists at work, learn about different research methodologies, and engage in discussions with researchers about their projects and experimental techniques.
- **Experimental Protocol Investigation:** Provide students with published experimental protocols from scientific journals or online databases. Students evaluate the validity and reliability of the protocols, identify potential sources of bias or error, and propose modifications for improvement.
- **Designing Controlled Experiments:** Task students with designing controlled experiments to test specific hypotheses in biology. Students must identify independent and dependent variables, control variables, and experimental procedures to ensure valid and reliable results.
- **Data Analysis Workshop:** Conduct a workshop on data analysis techniques commonly used in biological research, such as statistical analysis, graphical representation, and hypothesis testing. Students analyze datasets, interpret results, and draw conclusions based on statistical evidence.
- **Peer Review Simulation:** Divide students into small groups and assign each group a research proposal or manuscript to review. Students critically evaluate the experimental design,

methodology, and interpretation of results, providing constructive feedback to their peers.

- Experimental Demonstration: Perform a live demonstration of a biological experiment in the classroom or laboratory. Students observe the experimental procedure, data collection techniques, and safety protocols, gaining firsthand experience in experimental design and execution.
- Research Proposal Development: Guide students through the process of developing a research proposal for a biology-related project. Students outline research questions, justify the significance of the study, describe experimental methods, and anticipate potential outcomes and implications.
- Independent Research Project: Allow students to conduct independent research projects under supervision, focusing on a topic of interest within the field of biology. Students develop research questions, design experiments, collect and analyze data, and present their findings to the class.

# CAPS Environmental Science and Animal Health

## UNIT 4: Professional Skills Development through Career Exploration

| ESSENTIAL QUESTION | BIG IDEAS |
|---|---|
| **What are key professional skills needed to prepare future professionals in a career they are exploring?** | <ul><li>**Holistic Skill Development: Prioritize a diverse set of skills beyond technical expertise and including an entrepreneurial mindset.**</li><li>**Experiential Learning: Hands-on experiences, internships, apprenticeships, and project-based learning opportunities provide career exploration opportunities.**</li><li>**Mentorship and Networking: Facilitate mentorship programs and networking events to connect young professionals with experienced individuals in their field.**</li></ul> |

## GUIDING QUESTIONS

Content

- What are effective communication strategies and tools used in specific professions?
- Why are critical thinking, problem-solving and adaptability important?
- How can professional skill development bridge the gap between theoretical knowledge and practical application and enhance understanding of future career opportunities?
- How can mentors offer guidance, advice, and valuable insight most effectively?

Process

- How can students learn about their current strengths and opportunities for development?
- How can experiential learning opportunities holistically create opportunities to practice professional skills?

Reflective

- How does professional skill development foster lifelong learning and development?
- How can I take these skills and transfer them to post secondary and future careers?

**CTE Professionalism Standards**

1.1    Act as a responsible and contributing citizen and employee.

1.2    Apply appropriate academic and technical skills.

1.4    Communicate clearly, effectively and with reason.

1.5    Consider the environmental,social and economic impacts of decisions.

1.6    Demonstrate creativity and innovation.

1.7    Employ valid and reliable research strategies.

1.8    Utilize critical thinking to make sense of problems and persevere in solving them.

1.9    Model integrity, ethical leadership and effective management.

1.10   Plan education and career path aligned to personal goals.

1.11   Use technology to enhance productivity.

1.12   Work productively in teams while using cultural/global competence.

**CAPS Professional Profile**

**Skills:**  Communication, Collaboration, Time Management, Conflict Resolution, Critical Thinking, Interpersonal Relationship, Creativity, Leadership

**Attributes:** Adaptability, Curiosity, Self-awareness, Drive, Confidence, Enthusiasm, Resourcefulness, Integrity, Empathy

**Actions:** Networking, Interviewing, Goal Setting, Professional Manner

## KEY LEARNING EXPERIENCES

- Experiential learning opportunities such as project presentations, apprenticeships, client projects and internships.
- Interview opportunities with community members.
- Mentorship events where students are connected to professionals in their chosen careers.
- Development of digital portfolios and resume building that are industry standard and can grow with students.