INTRODUCTION

The field of biology is immense, and factors into more facets of life than a single volume could hope to encompass. Biology impacts nearly every corner of the medical and healthcare industry, as well as natural resource conservation, and the care and study of animals. The list of careers that are related to biology is long and varied, including everything from agricultural engineers, who make farming more efficient and sustainable, to dieticians, who design nutritional programs to help people lead healthy lives, to microbiologists, who study the tiniest organisms on Earth.

Broadly speaking, biology is the study of life. A key part of the natural sciences, biology focuses on elements such as cell theory, evolution, energy processing, ecosystems, and environments both external and internal.

With so many areas of biology to explore, one is not limited to merely becoming a 'biologist' through its pursuit. Anyone interested in diverse areas such as environmental conservation, exercise, forensics, and genetics can find a home under the biological umbrella. Chemistry and its many branches are also closely related.

Finding the path that's right for you means thinking about your own interests, skills, and talents. Important traits for working in biology include analysis, communication, critical-thinking, interpersonal, math, and problem-solving skills, not to mention a love of science, nature, and everything in between.

It's also worth thinking about how much money you want to make. A position that requires a four-year degree will earn you more money than one requiring a two-year degree, or one requiring no post-secondary education whatsoever. All the profiles in this volume include education requirements and typical earnings. Remember, however, that how much money you make is not the entire story. Benefits, job security, where you work, and self-fulfillment are important factors as well.

The "Conversations With..." spread throughout this volume, show the variety of career paths available in the field of biology, how to achieve them, and what to expect when you get there. They are interviews with real individuals working in the field at real jobs.

The list of jobs contained in this volume is not exhaustive, and should be viewed as an entry point into a world with many branches and sub-disciplines. The aim is to provide readers—especially students embarking on their lifelong careers—with accurate and detailed examples of some the vast possibilities available under the banner of biology.

Here are details about how certain careers can relate to biology:

Agricultural engineers attempt to solve agricultural problems concerning power supplies, the efficiency of machinery, the use of structures and facilities, pollution and environmental issues, and the storage and processing of agricultural products, all of which require knowledge of biology in order to maximize efficiency and effectiveness.

Anthropologists and archeologists study the origin, development, and behavior of humans, and must utilize biology in order to better understand human evolution.

Biological technicians help biological and medical scientists conduct laboratory tests and experiments, working in many different research areas.

Chemists and materials scientists study substances at the atomic and molecular levels and analyze the ways in which the substances interact with one another—similar to, and sometimes in tandem with, the work of microbiologists.

Conservation scientists and foresters manage the overall land quality of forests, parks, rangelands, and other natural resources, which requires an understanding of ecosystems and the organisms that reside within them.

Dietitians and nutritionists must take different biological factors into consideration when planning and conducting food service or nutritional programs to help people lead healthy lives.

Environmental scientists and specialists use their knowledge of the natural sciences to protect the environment and human health.

Epidemiologists are public health workers who investigate patterns and causes of disease and injury, including biological factors in humans and nature.

Exercise physiologists design exercise regimens for people suffering from illness or injury, and must tailor their programs to patients on a case-by-case basis, utilizing biological knowledge to increase effectiveness.

Forensic science technicians aid criminal investigations by collecting and analyzing evidence, which can include microbiology, entomology, and biological laboratory analysis.

Genetic counselors assess individual or family risk for a variety of inherited conditions, such as genetic disorders and birth defects.

Radiologic and MRI technologists are just two examples of healthcare imaging and diagnostic professions, which also include nuclear medicine technologists and diagnostic medical sonographers, and cardiovascular technologists and technicians, including vascular technologists.

Veterinarians use their training in animal biology to care for the health of animals and work to protect public health.

Agricultural Engineer

Snapshot

Career Cluster(s): Agriculture, Food & Natural Resources; Science, Technology, Engineering & Mathematics

Interests: Problem Solving; Decision Making; Critical Thinking; Environmental Science; Mechanical Engineering; Farming

Earnings (Yearly Average): $84,410

Employment & Outlook: Slower Than Average Growth Expected

OVERVIEW

Sphere of Work

Agricultural engineers attempt to solve problems concerning power supplies, the efficiency of machinery, the use of structures and facilities, pollution and environmental issues, and the storage and processing of agricultural products.

Biology is a very prominent aspect of agricultural engineering. In order to understand what tools, systems, or structures are needed in a given setting, these professionals must have an advanced understanding of the production of both plant and domesticated animal life. For example, an agricultural engineer may need to know the difference between harmful and beneficial microorganisms found in the soil used for planting crops to decide the best course of action for their clients.

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Work Environment

Generally, agricultural engineers work in indoor office spaces. However, they may frequent a variety of worksites, both indoors and outdoors, such as laboratories or agricultural environments.

Agricultural engineers with a focus in biology may spend more time doing lab work than field work.

Occupation Interest

Agricultural engineers have backgrounds in math, biology, physical science, and engineering. This career is ideal for someone with an interest in STEM as well as farming and the environment. A desire to work in a rural outdoor environment is beneficial. Depending on an agricultural engineer's additional interests, they may choose to specialize in a particular discipline related to the field. Those with a greater interest in the engineering aspect of this career may enjoy creating—and performing upkeep for—agricultural machinery. Conversely, someone more focused on plant biology may enjoy providing creative solutions to enhancing the quality and ensuring the health of crops and soil.

Profile

Working Conditions: Both Inside & Outside
Physical Strength: Light Work
Education Needs: Bachelor's Degree
Licensure/Certification: Optional
Opportunities for Experience: Internship; Apprenticeship
Interest Score: IRE

A Day in the Life—Duties and Responsibilities

Agricultural engineers work in farming, including aquaculture (farming of seafood), forestry, and food processing. They work on a wide variety of projects. For example, some agricultural engineers work to develop climate control systems that increase the comfort and productivity of livestock whereas others work to increase the storage capacity and efficiency of refrigeration. Many agricultural engineers attempt to develop better solutions for animal waste disposal. Those with computer programming skills work to integrate artificial intelligence and geospatial systems into agriculture. For example, they work to improve efficiency in fertilizer application or to automate harvesting systems.

Duties and Responsibilities

- Using computer software to design equipment, systems, or structures
- Modifying environmental factors that affect animal or crop production, such as airflow in a barn or runoff patterns on a field
- Testing equipment to ensure its safety and reliability
- Overseeing construction and production operations
- Planning and working together with clients, contractors, consultants, and other engineers to ensure effective and desirable outcomes

WORK ENVIRONMENT

Immediate Physical Environment

Agricultural engineers can work in both indoor office spaces and outdoor settings. When necessary, they will travel to agricultural settings to inspect the

equipment and machinery and assure they are functioning according to both the manufacturers' specifications and federal and state regulations. Some agricultural engineers occasionally work in laboratories to test the quality of processing equipment or the effects that specific growing conditions have on plants. They may work onsite to supervise livestock facility upgrades or water resource management projects. Often, they will have to observe the results of their work where the crops are grown, or the livestock are held.

Agricultural engineers work with others in designing solutions to problems or applying technological advances. They work with people from a variety of backgrounds, such as business, agronomy, animal sciences, and public policy.

Agricultural engineers typically work full time. Schedules may vary because of weather conditions or other complications. When working on outdoor projects, agricultural engineers may work more hours to take advantage of good weather or fewer hours in case of bad weather. This profession has one of the highest rates of injuries and illnesses of all occupations.

In addition, agricultural engineers may need to be available outside of normal work hours to address unexpected problems that come up in manufacturing operations or rural construction projects.

Human Environment

Agricultural engineers often work directly with other engineers, scientists, and supervisors, and in some cases, clients. To work in this field, an agricultural engineer needs effective communication skills. They work with colleagues to collaboratively find solutions to imposing problems affecting crop production, livestock, water supply, waste disposal, and much more.

When working with clients, agricultural engineers need to be able to discuss the needs of the council, farmer, or developer in order to supply quality advice and decide the best approach to tackling their issues. In addition, field work may require agricultural engineers to explain complex problems in uncomplicated terms to their clients whose knowledge of biology or engineering may not be as extensive.

Technological Environment

Agricultural engineers must have an understanding of varying computer software, such as analytical and scientific programs, computer-aided design (CAD) platforms, graphic or photo imaging packages, geographic information systems, and typical office applications. In addition, they comprehend the mechanics that