



Career

Information

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CAREER INFORMATION

VETERINARY SCIENCE IN SOCIETY

Veterinarians play a number of very important roles in the economy, health and wellbeing of South Africa. They contribute to the creation of wealth by controlling epidemic diseases among animals and increasing the profitability of commercial and small-scale farming enterprises. They also contribute to the production of sustainable sources of safe protein of animal origin, prevention of transfer of diseases from animals to humans, and they certify the disease (or diseases-free) status of animals and the safety of products for local and international trade. This ensures the security of employment for farm workers and contributes to the sustainability of rural economies. They also attend to the veterinary needs and general welfare of animals, both those of commercial importance and those kept as companion animals, the latter has been verified to have significant impact on the wellbeing of both pet owners and the community at large. It is because of this wide array of roles that veterinarians are more than just doctors for animals; they are in fact doctors for all humanity, for their society.

Curriculum

The duration of the course is six years (single degree structure). The core elective programme adopts an internationally recognized and recommended approach in which all candidates must complete a core curriculum over 4 ½ years (nine semesters). They will then complete a chosen elective over four months which will give them increased competencies to enter the profession in their chosen career paths. The training will be concluded with approximately 14 months of experiential training in the core and chosen elective components. The first year of the programme will continue to be offered at the Hatfield campus of the University of Pretoria and students will only move to Onderstepoort campus from the second year.

All veterinary graduates will, with effect from January 2015, be required to complete one-year compulsory community service. They would either be placed at the provincial veterinary services, identified animal welfare non-government organisations, the South African Police Service (SAPS) or the South African National Defense Force (SANDF).

The many possible career paths of veterinary scientists

Research: The veterinarian is involved in research in a wide spectrum of areas (veterinary, agricultural and biomedical sciences research institutions) in matters which may relate to pharmaceutical product development, animal improvement and monitoring the utilisation of animals for experimental purposes.

State veterinarians: They render essential regulatory services relating to the diagnosis, surveillance, monitoring, control, prevention and eradication of controlled and notifiable diseases. They are also responsible for matters relating to the import and export of animal products and for food safety and security. State veterinarians are also increasingly providing a targeted clinical and primary animal health care service to small scale farmers and holistic pet care to marginalized communities.

The provision of routine disease diagnostics or forensic services involving disciplines such as pathology, clinical pathology, microbiology and toxicology in the private, state and diagnostic laboratories is another possible path for budding veterinarians. (Veterinarians are also involved in general matters pertaining to the welfare of animals through the promotion of appropriate livestock husbandry practices, nutritional advice, diseases prevention strategies and sound livestock production system.)

Veterinary public health: Veterinarians are also responsible for ensuring the maintenance of health and safety of meat in abattoirs and milk hygiene in milk processing plants, through this ensure the control of zoonosis (diseases transferrable directly or indirectly from animals to humans.)

Private practice/Companion animal practice: Provide veterinary services for pets owners (dogs, cats, exotic animals and birds)

Rural practice: Provide veterinary services for commercial farmers (sheep, goats, cattle, horses, pigs, poultry and game)

Breeders (dogs, pigs, sheep and goats),
Services for animal welfare organisations, game reserves and zoos

Entry requirements for B.V.Sc. (M score 30)

Mathematics:	5 (60-69%)	Institution:	University of Pretoria
Physical Science:	5 (60-69%)	Duration:	Six years
Two other subjects:	4 (50-59%)		
Two languages:	4 (50-59%)		

(one of these must be English)

Potential employers

Employment opportunities are immediately available in government institutions, research organisations and meat-producing organizations, private practices, animal welfare NGOs, pharmaceutical companies, SAPS, SANDF, Universities and private diagnostic laboratories.

WHAT IS AGRICULTURAL ECONOMICS?

Agricultural economics applies economic principles to solving agricultural and agribusiness problems (specialist knowledge of agriculture is an advantage). Agricultural economist analyses and advice on the optimal use of production of food and fibre in the internationally competitive milieu. Agricultural economics and Agribusiness management focuses on the following:

- Effective functioning of an organisation concerned with the agricultural and agribusiness sector.
- Agricultural development, marketing and finance, agricultural policy and consumption affairs, agricultural sales and marketing, brokerage, market research,

Materials Engineer, Mining Engineer, Production Manager, Quality Manager, Process Design Engineer, Process Control Engineer, Biochemical Engineer, Environmental Engineer, Technical Sales Engineer, Food Processing Engineer, Process Plant Manager or Systems Engineer.

Entry requirements

Mathematics: 4 (50 - 59%)

Physical Science: 4 (50 - 59%)

Programme and Duration

National Diploma: Chemical Engineering – 3 years

Bachelor of Science. Engineering (BSc Eng.) - 4 years

Institutions

Most Universities

international trade and market development, finance, public relations, food manufacturing, processing, distribution and purchasing, etc.

Curriculum

The field of study of agricultural economics can be divided into seven components, namely:

- **Production economy:** This involves the relationship between the inputs, production and profit as well as labour utilization.
- **Financial management:** This includes aspects such as the management process itself, agricultural planning and the principles of financing.
- **Agricultural marketing:** This involves all aspects of marketing such as the price system and market types.
- **Agricultural policy:** This involves the interaction between agriculture and other sectors, the trade policy, production policy, price and income policy and the government functions.
- **Agricultural development:** This is about the role which agriculture plays in the development of the economy as well as the role of the government and private initiative.
- **Operational research:** This is the application of economic simulation and optimization techniques on agricultural problems.
- **Agricultural environmental economics:** The economic evaluation of the interaction between agricultural production processes and the natural environment.

Agricultural economists work both indoors, in offices and outdoors, doing research and consultations on farms.

Entry requirements

Mathematics	4 (50-59%)
Physical Science	4 (50-59%)
English/Afrikaans	4 (50-59%)
Additional Language	4 (50-59%)
Life orientation	4 (50-59%)

Programme and Duration:

B.Sc. Agricultural Economics – four years

B.Com. Agribusiness Management – three years

Where to acquire training

Universities of Pretoria, Free State
Stellenbosch or KwaZulu-Natal

Career opportunities

- **Private Sector:** Accounting and management firms, agribusiness firms e.g. input suppliers and food industry; farming and eco-tourism, financial institutions, consulting services
- **Government:** National and Provincial Departments of Agriculture, Development Bank of Southern Africa, Universities.

- **Non-governmental Organisations:** Development corporations and financial institutions (commercial banks), national and international NGOs and donors, research and policy institutions

WHAT IS ANIMAL SCIENCE?

Animal Science is concerned with the science and business of producing domestic livestock species, including but not limited to beef cattle, dairy cattle, poultry, sheep, and pigs.

What does an Animal Scientist do?

An animal scientist will typically do the following:

- Conduct research and experiments concerning animal nutrition.
- Develop ways to improve the quantity and quality of farm animals
- Communicate research findings to the scientific community, food producers, and the public

An animal scientist applies the principles of biological, physical, and social sciences, in order to address problems associated with livestock production and management. An animal scientist advice farmer on how to upgrade housing for animals, lower animal death rates, handle waste matter, and increase production amongst others.

Animal scientists help put food on our tables. They work with farmers to improve animal breeding, growth and nutrition. When animals grow well and stay healthy, farmers can produce more meat, milk or eggs for our consumption.

Entry Requirements

National Senior Certificate with Matriculation - Bachelor pass

Mathematics	4 (50 – 59%)
Physical Science	4 (50 – 59%)
Life Science	4 (50 – 59%) or
Agricultural Science	4 (50 – 59%)

Programme and Duration

B.Sc. Animal Science - 4 years
Africa
B Agric: Animal Production - 3 years

Where to acquire training

Most universities across South

Career Opportunities

Students who completed a B.Sc. degree with majors in animal science are qualified for a wide variety of challenging careers. In fact, there are different job classifications for animal science graduates.

Graduates find employment in academic teaching and research, industrial research in the food and feed industries, in laboratory research programs with governmental and international agencies, private corporations, and in industrial or institutional management positions requiring a high level of scientific training.

In government positions, graduates can help draft regulations governing the animal science/production industry, or work directly in research. Other employment can be found with feed manufacturers, animal breeding companies, consulting firms, universities, or in primary production.

WHAT IS SOIL SCIENCE?

Soil Science is a science dealing with soil as a natural resource on the surface of the earth including soil formation (the processes whereby soil is formed), classification (the classification of soil according to its properties) and mapping; physical, chemical, biological and fertility properties of soil; and these properties in relation to the use and management of the soil.

What does a soil scientist do?

The job of a soil scientist includes collection of soil data, consultation, investigation, evaluation, interpretation, planning or inspection relating to soil science.

Entry requirements

Mathematics: 4 (50 - 59%)
Physical Science: 4 (50 - 59%)
Life orientation: 4 (50 - 59%)
English/Afrikaans: 4 (50 - 59%)
Other languages: 3 (40 - 49%)
Recommended subject: Geography

Programme and Duration

BSc (Agric.): Soil Science - 4 years
Africa
N Dip: Soil Science - 3 years

Where to acquire training?

Most universities across South

A soil scientist's job may involve:

- Determining the hydric (wetness) characteristics of the soil.
- Helping to design hydrologic plans in suburban area.
- Monitoring the effects of farm, ranch, or forest activities on soil productivity.
- Advising land managers of capabilities and limitations of soil (e.g. timber sales, watershed rehabilitation projects, transportation planning, soil productivity, military maneuvers, and recreation development).
- Managing soil for crop production, forest products and erosion control management.
- Managing soils for landscape design, mine reclamation and site restoration.
- Investigating forest soils, wetlands, environmental endangerment, ecological status, and archeological sites.
- Assessing application of water including non – hazardous process wastes (residue and sludge management).
- Conducting studies on soil stability moisture retention or drainage sustainability of environment impact.
- Assessing environmental hazards, including non-hazardous waste sites that

involve soil investigation techniques, evaluation of chemical fate and transport phenomena, and re – mediation alternative.

Soil science jobs are available in:

- Agricultural Research Council
- Research institutes and organizations
- Departments of Agriculture
- Universities
- Agricultural co-operatives
- Fertilizer manufacturers
- Council for Scientific & Industrial Research
- Self-employment, can start own business and practice as an analyst, soil surveyor and development consultant to the agricultural industry, the construction industry, development cooperatives, commercial banks and landscape architects

WHAT IS BIOTECHNOLOGY?

Biotechnology is the use of living systems and organisms to develop or make products, or "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for manufacture products intended to improve the quality of human life or specific use". Most biotechnology products are associated with agriculture, food industry and medicine.

Biotechnology covers many different disciplines (eg. genetics, biochemistry, molecular biology, bioinformatics, chemical engineering, etc.). New technologies and products are developed every year within the areas of e.g. medicine (development of new medicines and therapies), agriculture (development of genetically modified plants to tolerate specific herbicides, resistant to specific plant diseases & insect pests, development of new animal vaccines, biofuels, biological treatment, etc) or industrial biotechnology (production of chemicals, paper, textiles and food).

Careers in biotechnology

Various biotechnology careers includes amongst others biochemist, bioinformatician, biophysicist, bioinformatics specialist, biomedical engineer, biotechnology laboratory technician/assistant, microbiologist, DNA analyst, crime lab technician (forensic science technician), biotechnology research associate, clinical research associate, environmental engineer, quality control analyst / engineering, researcher, research scientist, etc.

Entry requirements

Life Sciences	4 (50-59%)
Physical Sciences	4 (50-59%)
Chemistry	4 (50-59%)
Mathematics	4 (50-59%)

Where to acquire Training

The University of Johannesburg

Programme and Duration

BSc. Biotechnology: 3 - 4 years

University of Witwatersrand
University of Pretoria
Vaal University of Technology
Tshwane University of Technology

N Dip: 3 years

ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Impact Assessment (EIA) is a sub-component of Environmental Management, responsible for the review of development applications. The above-mentioned applications are submitted to the Department by Environmental Assessment Practitioners (EAP) on behalf of private developers or public bodies.

Applications submitted are then reviewed by a multi-disciplinary team of officials. Different aspects of each application is investigated and reviewed, with a focus on potential positive and negative impacts of the proposed development on the environment as well as the potential impacts on the existing environment for each proposed application. Decisions on the above submitted applications could either be the authorization of the application with conditions to manage the impact or a negative decision that prevent or limits the proposed development, should it be found that the extent of the impact is unacceptable.

Entry requirements

Life Science 4 (50 – 59%)
Physical Science: 4 (50 – 59%)
Geography: 4 (50 – 59%)
Mathematics: 4 (50 – 59%)

Programme and Duration

BSc. Environmental Management: 3 – 4 years
N Dip: Environmental Management

Where to acquire training

Universities of Technology
Universities

Career opportunities

(Government) Environmental Officials
(Private Sector) Environmental official/Safety, Health and Environmental official.

WHAT IS NATURE CONSERVATION?

Nature conservation is the management and enhancement of natural plant and animal communities; and occasionally modified vegetation. This career involves:

- (1) The management of protected areas
- (2) The regulation of use of natural resources through a permit system and research
- (3) Interacting with people regarding the use of natural resources

Nature Conservation promotes the sustainable use of our living natural resources, protects ecological processes and ensures that biodiversity is protected for future generations.

Role of Nature Conservators

The nature conservator is responsible for the conservation and management of natural ecosystems, habitats and communities, to ensure the maintenance of biological diversity.

Nature Conservation regulates the use of living natural resources to ensure sustainable use through a permit system. Nature conservators do inspections of permit applications to ensure that plants are correctly identified and animals are kept in acceptable circumstances. The nature conservator after inspection makes recommendations about the issuance or refusal of permit applications.

The work is often physical and done under climatic extremes, and may involve unpleasant tasks such as culling animals.

Duties will also involve tasks like fencing, road construction, veld burning, building maintenance, collection of data and information and presentations to school groups and other interested people.

Programme and Duration

N Dip: Nature Conservation – 3 years
Technology

BSc: Conservation Ecology – 3 years

BSc: Natural Sciences – 3 years

Where to acquire training

Tshwane University of

University of South Africa

University of Johannesburg

University of the Witwatersrand

Training in the above mentioned fields are also offered by other universities.

Career opportunities

Career opportunities include: nature conservators, wildlife managers, extension work, community outreach and involvement, protected area expansion, research, law enforcement, ecologist, eco-tourism, conservation management on nature and game reserves and estates, parks boards, provincial nature conservation departments, certain municipalities and larger forestry companies.

The Gauteng Department of Agriculture and Rural Development has a Directorate for Biodiversity Management which employs nature conservators and scientists. The Directorate manages nature reserves, manages permit applications and does research about conservation issues.

WHAT IS GEOGRAPHIC INFORMATION SYSTEM?

A geographic information system (GIS) is a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. GIS technology integrates common database operations such as query and statistical analysis with the unique visualization and geographic analysis benefits offered by maps.

Individuals who use geographic information system (GIS) technology to compile and display digital data are known as GIS specialists. GIS specialist work with computer software to create and maintain data and/ maps that can be combined with geographically referenced data.

What does GIS do?

- Analyze spatial data
- Provide expert advice and services for users of GIS systems
- Create maps
- Work with remote sensing and imagery to locate special features on a landscape
- Monitor conservation easements and locate natural features with remote sensing

Career opportunities

GIS specialists work in a variety of organisations. The majority of their work is conducted indoors from a computer. Occasionally GIS specialists must "ground truth" a site, this is done by going into the field and comparing what is on the ground with what the GIS system identifies.

The versatility and efficiency of GIS systems has created a high demand for GIS specialists. Private natural resource management companies employ a large number of GIS specialists to make maps, conduct remote sensing, calculate statistics, and keep data organized and accessible. State and agencies also hire GIS specialists for similar reasons. GIS is used in almost every modern profession, more powerful computers and remote sensing methods will continue to create a demand for GIS specialists.

GIS professionals are highly employable in a growing variety of careers using GPS (Global Positioning Systems), geo-database systems, geo-information technology, satellite imagery and remote sensing.

They may work under a wide variety of job titles, including GIS Analyst, GIS Technician, and Cartographer.

Entry requirements

Mathematics:	5 (60-69%)
Physical Science:	5 (60-69%)

Programme and Duration

BSc: Geo-informatics - 3 years

South African Geomatics Council (SAGC)

All qualified GISc Practitioners have to be registered with the South African Geomatics Council SAGC (previously PLATO). Professional, Technologist and Technician Surveyors in training can also register with SAGC. To become a registered Geomatician with SAGC various specified exams have to be passed, council fees paid, work experienced tasks certified and registration forms completed.

Recognized Institutions

It is important to note that only the institutions listed below are recognized by SAGC:

- University of Cape Town,
- Stellenbosch University
- Cape Peninsula University of Technology,
- University of Pretoria,
- University Free State, and

- ESRI South Africa.

WHAT IS ENVIRONMENTAL HEALTH?

Environmental health comprises those aspects of human health, including quality of life, that are determined by physical, chemical, biological, social and psychosocial factors in the environment.

What do environmental health officers do?

Are responsible for carrying out measures for protecting public health, including administering, compliance promotion and enforcing legislation related to environmental health and providing support to minimize health and safety hazards. They are involved in a variety of activities, for example inspecting food facilities, investigating public health nuisances, and implementing disease control. Environmental health officers are focused on prevention, consultation, investigation, and education of the community regarding health risks and maintaining a safe environment. They act as a public arbiter of environmental health standards, maintaining close contact with the community.

Career Opportunities

- Air Quality Technician
- Disease Control
- Public Health Officer
- Food and Restaurant Quality Control and Inspections
- Public Utilities
- Sanitation Services
- Toxicologist

Entry requirements

Mathematics: 4 (40 - 49%)
 Physical Science: 4 (50 - 59%)
 Life Science: 4 (50 - 59%)

Programme and Duration

N Dip: Environmental Health – 3 years
 Technology
 B Tech: Environmental Health – 4 years

Institutions

Tshwane University of
 University of Johannesburg

WHAT IS ANALYTICAL CHEMISTRY

Analytical chemistry is the science of obtaining, processing, and communicating information about the composition and structure of matter. In other words, it is the art and science of determining what matter is and how much of it exists.

Chemistry is a “central science” which involves many scientific fields. Chemistry deals with matter and its changes. Chemists are concerned with the production and

use of energy. Chemistry also seeks to understand the composition of substances and then apply this knowledge to meet society's needs.

What do Analytical Chemist Do?

Analytical Chemists perform controlled experiments to explore the exact chemical components of a substance. Typically they will analyze various samples to discover what it is made of and how it reacts under certain conditions. Utilizing various pieces of specialized equipment and advanced software, data is collected and analyzed to determine possible uses for the substance. They must then write up complex technical reports detailing their findings. In addition, Analytical Chemists may be required to work on research teams and collaborate with other experts to achieve their end goal.

Analytical chemists may be involved in work as diverse as:

- Chemical or forensic analysis
- Air pollution management
- Process development
- Product validation
- Toxicology
- Drug formulation and development.

Career opportunities

Employment opportunities exist in research and development laboratories, industries such as detergent, petroleum, plastics, food, metals, pulp and paper and pharmaceuticals and educational institutions. Graduates may be employed in a laboratory or do production work. Quality control and assurance is a field with a growing demand for these graduates. Graduates are able to conduct routine tests on raw materials, products or environmental samples or prepare basic chemical compounds.

They are employed by a variety of public and private sector organisations, and can specialise in areas such as toxicology, pharmaceuticals, quality control or forensics.

Typical employers of analytical chemists

Government agencies, Government Environment Departments, Publicly funded research councils, Hospitals, Universities, Public health laboratories, Environmental agencies, Specialist research organisations, Consultancies, Testing companies, Private food, materials, polymers, biotechnology or pharmaceutical and chemical companies

Jobs in the chemical industry

- Chemical Analysts
59%)
- SHE Managers/Officers
59%)
- Research Assistants

Entry requirements

Mathematics: 4 (50 -

Physical Science: 4 (50 -

- Laboratory Managers
- Quality Control

Programme and Duration

National Diploma: Analytical Chemistry: 3 years
Bachelor of Science (Chemistry) - 3 years

Institutions

University of Johannesburg
Vaal University of Technology
University of Witwatersrand

CHEMICAL ENGINEERING

Chemical Engineering is the branch of engineering which deals with large-scale industrial processes that convert, by physical or chemical change, raw materials into products with a higher economic and social value

What do Chemical Engineers Do?

Chemical engineering is all about turning raw materials into useful, everyday products. The clothes we wear, the food and drink we consume and the energy we use all depend upon chemical engineering. Chemical engineers work out the processes to make all these products, while also helping to manage the world's resources, protect the environment and ensure health and safety standards are met.

- Specifically, chemical engineers improve food processing techniques, and methods of producing fertilizers, to increase the quantity and quality of available food.
- They also construct the synthetic fibers that make our clothes more comfortable and water resistant; they develop methods to mass-produce drugs, making them more affordable; and they create safer, more efficient methods of refining petroleum products, making energy and chemical sources more productive and cost effective.
- Chemical engineers also develop solutions to environmental problems, such as pollution control and remediation.

Career Opportunities

Design, operate and manage large-scale industrial processes that convert chemicals, minerals, or foodstuffs from one form to another, in areas such as manufacturing, the petroleum industry, water and waste management, mining and pharmaceuticals.

Employment is found in a wide range of industries including food processing, wine production, pharmaceuticals, biotechnology, fertilizers, fuel technology, oil refining, minerals processing, chemical manufacturing, and synthetic fibres. Employment opportunities also exist in government and Higher Education institutions.

Jobs in Chemical engineering industry

- Air Pollution Management, Analytical Chemist, Energy Manager, Manufacturing Engineer,