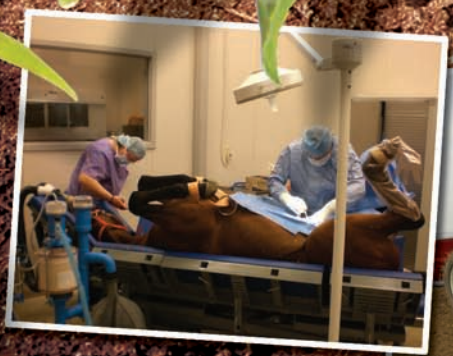
Career guide on scarce skills in Agriculture

Department of Agriculture, Forestry and Fisheries

career options

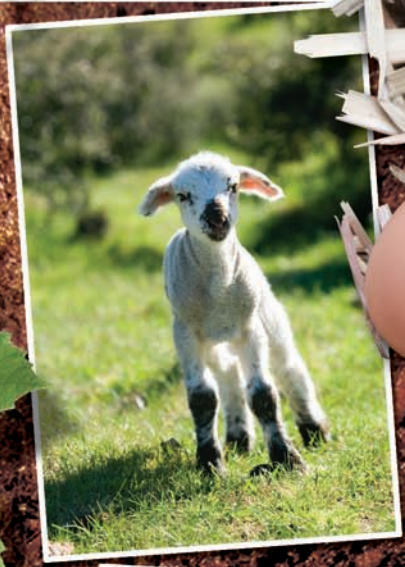
study options

opportunities



agriculture, forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA



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Contents

Agricultural Economics

Agricultural economics and agribusiness management play a role in the effective functioning of an organisation concerned with the agricultural and agribusiness sector. Agricultural economists analyse and advise on the optimal use of production factors for the environmentally sustainable production of food and fibre in an internationally competitive milieu. They have a broad knowledge of agriculture, commerce and social science and are capable of solving problems relating to agricultural development, marketing and finance, agricultural policy and consumption affairs, agricultural sales and marketing, brokerage, market research, international trade and market development, finance, public relations, food manufacturing, processing, distribution and purchasing, and the farm input industry. Students wishing to be considered for admission at first-year level have to meet the following entry requirements:

Curriculum

Areas of study at university level include economics, agricultural economics, agricultural development planning, agricultural marketing, agricultural policy, accounting, labour law, business law and business management.

Entry requirements for B.Sc./B.Com. Agricultural Economics

Mathematics:	4 (50–59%)
Physical science:	4 (50–59%)
English/Afrikaans:	4 (50–59%)
Additional Language:	4 (50–59%)
Life orientation:	4 (50–59%)

(excluded when the APS is calculated)

Duration:

B.Sc. Agricultural Economics – four years
B.Com. Agricultural Economics – three years

Institutions:

University of Pretoria
University of Stellenbosch
University of the Free State
University of KwaZulu-Natal

Role of agricultural economists

Interesting and innovative careers and opportunities exist for agricultural economics graduates in agricultural corporations, agribusiness firms, food and fibre organisations, government institutions, NGOs and rural development institutions, farming and ecotourism, financial institutions (commercial banks), futures and commodity trading, research and policy institutions, international economic development and donor institutions, universities and consultation services, energy sources and mechanisation.

Agribusiness management

- Developing, designing and managing supply chains as well as value systems for specific products, industries and subsectors
- Examining the demand for resources by businesses and their supply response
- Farm planning and control, farm information systems, data analysis and budgeting, organisation of capital, farm machinery management
- Economics, labour economics and management, financial leverage, farm enterprises' growth and liquidity, and risk management

Marketing

- Production, processing and distribution of goods, focusing on the flow of food and fibre to their final destination and the determination of prices at each stage
- Commodity futures trading: trading commodities such as maize, wheat and citrus between farmers and the market
- Market research, brand management, economic analysis (trend management), surveys, and import and export management (examining foreign trade relationships for food and fibre products)
- Agricultural statistics such as trend analysis in production, agricultural exports, prices, variations analysis, indices (CPI, PPI, Chain Index, etc.)
- Financial services (banks, financial institutions and agribusiness industries)

Resource economist (focuses on the use and preservation of natural resources)

- The application of economic principles to issues such as air and water pollution, resource conservation, land-use policy, and the evaluation of environmental resources
- Identifying and analysing policies and strategies for meeting the world food needs in ways that ensure the sustainability of the natural resource base

Agriculture and rural development

- Government programmes for specific commodities that will support incomes of farmers and provide food and fibre for low-income consumers
- Business plan formulation, capacity building (training) and support for smallscale farmers and resource-poor farmers
- Identifying and overcoming constraints to the development of agriculture in developing countries
- Financial needs analysis, risk and valuation analysis,

feasibility studies, cash flow planning and profit management
- Financing and supply of capital to business

Potential employers

Interesting and innovative careers and opportunities exist for agricultural economics graduates in agricultural corporations, agribusiness firms, food and fibre organisations, government institutions, NGOs and rural development institutions, farming and ecotourism, financial institutions (commercial banks), futures and commodity trading, research and policy institutions, international economic development and donor institutions, universities and consultation services.

Bioresource Engineering

Bioresource engineering is the application of science and technology in agriculture, food and biological systems. The agricultural engineer's field of employment includes a wide spectrum of activities which are connected to nearly all other engineering disciplines. Students wishing to be considered for admission to the first year have to satisfy the following entry requirements:

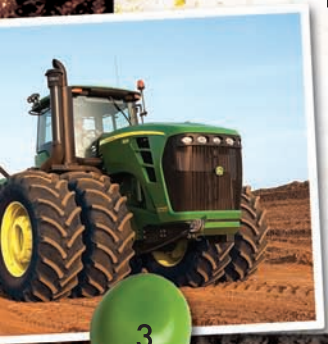
Curriculum

The university curriculum consists of water resource management, which includes drought and floor planning, water quality, irrigation and drainage, and dam design.

Engineering for food fibre production includes design, development and the efficient utilisation of machinery. Environmental engineering incorporates animal friendly building and devices, soil conservation and animal waste management.

Entry requirements (NSC or equivalent level with an M of 33–35)

Mathematics:	6 (70–79%)	English:	4 (50–59%)
Physical Science:	6 (70–79%)	Three other subjects:	4 (50–59%)
Life Orientation:	4 (50–59%)		



Role of agricultural engineers

Bioresources engineering goes well beyond the farm boundaries into ar-

eas such as water resource management, forestry, mining rehabilitation, food processing, peri-urban and rural development, machinery development and manufacture, waste management and ecology as well as agricultural vehicles and systems.

Energy sources and mechanisation

Through innovation, research and development sourcing, agricultural engineers contribute to alternative sources of energy and machinery, and the improvement of existing machinery. Agricultural engineers select appropriate materials and manufacturing processes to carry out the construction and testing of basic devices.

Farm structures

Agricultural engineers also contribute to environmental control for livestock and plants such as poultry, piggery and dairy structures, greenhouses and agricultural production systems. In addition, systems for intensive meat, milk and egg production, and storing, drying, refrigeration, and processing of a large variety of other agricultural products are also designed by agricultural engineers. These structures are created in accordance with the animals' need and product demands.

Irrigation engineering

Irrigation engineers' services involve the design of new and improvement of existing irrigation and pumping systems such as centre pivot, microjet, drip, sprinkler and flood irrigation systems.

Engineering and environmental hydrologists

Engineering hydrologists' tasks encompass flood estimation, flow routing, dam design for agricultural and small catchments, spillway design, plunge and spray dip designs and water resource management.

Professional status

A B.Sc. Agricultural Engineering degree is recognised as a qualifying degree for registration as a professional engineer under the Professional Engineers Act, 1968. The degree is accredited by the Engineering Council of South Africa and the South African Institute of Agricultural Engineers.

Duration: Four years

Institution: University of KwaZulu-Natal

Potential employers

The profession offers exceptional opportunities in areas such as research, development, project management, consulting services and the establishment of private business enterprises and farming systems for individuals with the necessary entrepreneurial abilities and initiative. Interesting and innovative careers and opportunities open to agrcultural engineering graduates exist in the Department of Agricuture, Forestry and Fisheries (DAFF), agricultural research institutes, universities, consulting and engineering organisations, food processing companies, and agricultural equipment and systems manufacturers.

Food Science and Technology

Food Science

Food Science involves the application of scientific principles in the development and supply of healthy, safe, nutritious and affordable food for human consumption. Functions of the food scientist include involvement in the development of many novel food products that are now freely available in shops, e.g. long-life milk, frozen and canned foods, snack foods and ready-to-eat meals. Secondly, food scientists are trained to meet the challenge of developing and supplying foods that comply with the ever-changing demands of the modern consumer. Finally, food scientists lead the fight against hunger and malnutrition through the development of affordable, nutritious foods. Examples are instant weaning porridges, components of cereals and legumes as well as staple foods fortified with vitamins and minerals. A food scientist must be knowledgeable about the chemical composition, structure and nutritional value of food, food processing and preservation techniques, and the chemical, physical and biological changes that occur in food during processing, preservation and storage.

Food technology

Food technology is the study of the large-scale selection, production, processing and preservation of foods as well as the development and analysis of foodstuffs in industrial food-processing facilities. It further involves packaging, distribution and the use of safe, nutritious and wholesome food. Food technologists are involved in areas of food manufacture such as quality assurance, processing technology, chemistry and microbiology. In addition, they are trained to ensure that both legal and industrial food standards are monitored and maintained prior to marketing.

Food technologists are also part of research teams and have to solve technical problems when raw materials are converted

into preserved foods in factories. Food technologists are concerned with issues pertaining to the production, preservation and development of high-quality foods. They also manage processing plants and quality assurance laboratories. They are charged with the monitoring of food quality standards by government bodies, such as the SABS. Students wishing to be considered for admission to the first year have to satisfy the following entry requirements:

Entry requirements for B.Sc. Agriculture Food Science and National Diploma in Food Technology(M score 30)

Food science

Mathematics: 4 (50–59%)
Physical Science: 4 (50–59%)
Two languages 4 (50–59%)
Two other subjects: 4 (50–59%)

Institutions

University of Stellenbosch
University of Pretoria

Duration: Four years

Job opportunities:

- Food production manager/ assistant
- Fresh food manager/assistant
- Food buyer
- Cookery school consultant
- Food stylist
- Consumer advisor
- Food promotion consultant, etc

Food technology

Mathematics: 4 (50–59%)
Physical Science: 4 (50–59%)
Mathematics Literacy: 4 (50–59%)

Institution: Cape Peninsula University of Technology

Duration: Three years

Job opportunities:

- Industrial food manufacturers
- Beverage manufacturers
- Bottling plants
- Canning companies
- Dairies
- Fish and meat processors

Veterinary Science

Veterinarians play an important role in the economy 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 and the prevention of

the transfer of diseases from animals to humans, and they certify the disease (or disease-free) status of animals and the safety of products for local and international trade. They attend to the veterinary needs and general welfare of animals, both those of commercial importance and those kept as companion animals.

Curriculum

The duration of the course is six years (single degree structure). The core elective programme adopts an internationally recognised and recommended approach in which all candidates must complete a core curriculum over 4,5 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 the Onderstepoort campus from the second year.

Role of veterinary scientists

Research: The veterinarian is involved in research in a wide spectrum of areas (veterinary, agricultural and biomedical sciences) in matters relating to 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 notifiable diseases. They are also responsible for matters relating to the import and export of animal products and for food safety and security.

The provision of routine or forensic services involving disciplines such as pathology, clinical pathology, microbiology and toxicology in the private, state and diagnostic laboratories (Veterinarians are also involved in general matters pertaining to the welfare of animals through the promotion of appropriate husbandry practices, nutritional practices, disease prevention strategies and sound production systems.)

Veterinary public health: Veterinarians are responsible for ensuring the maintenance of meat and milk hygiene in abattoirs and milk processing plants and the control of zoonotic diseases (diseases transferred from animals to humans).

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

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

Breeders (dogs, pigs, sheep and goats)

Services for animal welfare organisations, game reserves and zoos

Selection of applicants

A total of 140 students will be admitted to the programme. The faculty endeavours to meet the veterinary needs of the country and the specific requirements of higher education legislation through the selection of applicants. The recruitment and selection process is therefore structured in such a way that it will reflect national demographics and government policy. The procedure will be reviewed on an annual basis providing for the following categories:

- School leavers
- Students with tertiary exposure
- International students

Students with tertiary exposure are selected on the basis of academic performance, an institutional proficiency test and an interview as required.

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

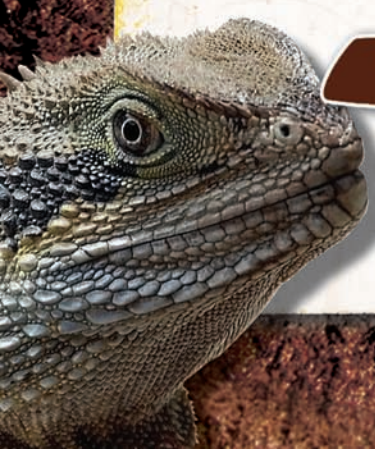
Mathematics: 5 (60–69%)
Physical Science : 5 (60–69%)
Two other subjects: 4 (50–59%)
Two languages: 4 (50–59%)
(one of these must be English)

Institution: University of Pretoria

Duration: Six years

Potential employers

The majority of veterinarians offer clinical services, disease prevention strategies, advice in nutrition, management, production and reproduction of animals. Employment opportunities are available in government institutions, research organisations and meat-producing organisations.



Viticulture and Oenology

Viticulture

Viticulturists apply scientific principles to manipulate the vine to produce the kind of grapes necessary for the production of

different wine types and styles as well as augmenting both the quality and quantity of grapes. Viticulturists share a mutual purpose, which is to make world-class wines to accompany food for pleasurable drinking.

Viticulturists learn theoretically and practically how the correct methods of anatomy, morphology, physiology, ampelography of scion and rootstock cultivars, plant improvement, natural and artificial disorders of the grapevine, spacing and trellising, pruning, canopy uality assessment and management as well as selection of cultivar and terrain, grape handling and packaging can contribute to the desired product.

The production of wine is done by striking a balance between soil, climate, geography, winery "softness" and winery hygiene. Students wishing to be considered for admission to the first year have to meet the entry requirements.

Oenology

Oenologists learn about the principles and practices of wine-making such as applied chemical and microbiological processes involved in producing wines, sweet wines, grape juice, concentrates and brandy, wine stabilisation as well as analysis and sensory evaluation of wine and brandy.

Curriculum

Different curriculum choices enable students to major in any one of the following:

Viticulture and Oenology
Viticulture and Soil Science
Viticulture and Entomology
Viticulture and Plant Pathology
Viticulture and Agricultural Economics
Oenology and Chemistry
Oenology and Enterprise Management

Entry requirements for B.Sc. Agriculture in Viticulture/Oenology

Mathematics: 4 (50–59%)
Physical Science: 4 (50–59%)
Life Orientation: 4 (50–59%)
English/Afrikaans: 4 (50–59%)
OR
Physical Science: 3 (40–49%)
Life Science: 4 (50–59%)

Institution: University of Stellenbosch

Duration: Four years (B.Sc. Agric.)

Potential employers

Qualified viticulturists are employed in universities, at the Agricultural Research Council, in wine companies, on estates, in wine cellars, on farms, and in consulting companies and marketing companies.

Grassland/Pasture Science

Grassland Science is divided into two categories: Rangeland Management and Grassland Management.

Rangeland Management

Rangeland Management is a discipline and an art that applies an organised body of knowledge accumulated by range science and practical experience for two purposes. The first is the protection, improvement, and continued welfare of the basic resources, which in many situations include soils, vegetation, endangered plants and animals, wilderness, water and historical sites. The second is the optimum production of goods and services in combinations needed by society. Rangeland Management requires the selection of alternative techniques for optimum production of goods and services with no damage to the resources. While emphasis is often placed on the management of domestic animals, the main goal is rangeland resource rehabilitation, protection and management for multiple objectives, including biological diversity, preservation and sustainable development for people.

Grassland Management

Grassland Science is the study of all aspects of the utilisation, conservation and improvement of the veld and cultivated pastures. The education of grassland scientists is essential for sustainable animal production, on rangeland and cultivated pastures.

Grassland Science not only plays an important role in the increasing demand for meat and other animal products, but it also make a large contribution to soil and nature conservation, game farming and the future of game parks, which are important for the tourism industry.

Entry requirement for B.Sc. in Pasture/Grassland Science

B.Sc. Agric.

Mathematics: 4 (50–59%)
Physical Science/Biology (recommended): 4 (50–59%)

Duration: Four years (full time)

Institution: Most universities

National Diploma: Nature Conservation

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

Duration: Three years (full time)

Institution: Most universities of technology

Plant Pathology

Plant Pathology is defined as the study of the organisms and environmental conditions that cause disease in plants, the mechanisms by which these factors cause disease, the interactions between these causal agents and the plants (effect on plant growth, yield and quality), and the methods of managing or controlling plant diseases. It also interfaces with knowledge from other scientific study fields such as Mycology, Microbiology, Virology, Biology, chemistry and Bioinformatics.

Entry requirements for B.Sc. in Plant Pathology

Physical Science:	4 (50–59%)
Life Orientation:	4 (50–59%)
Mathematics:	4 (50–59%)
English/Afrikaans:	4 (50–59%)
Other languages	4 (50–59%)

Institution: Most universities

Duration: Four years (full time)

Potential employers

The profession offers exceptional opportunities for research in national and provincial government departments, and as plant pathologists in the ARC, agrochemical companies, seed companies, fertiliser companies, universities, farms, nurseries and pharmaceutical companies.

Soil Science

Soil scientists specialise in the origin of soils and the formation thereof: origin/development and composition of soil and soil-forming factors. The field also covers the most important physical characteristics of soil: texture, structure, colour, consistency, overall density, soil air, temperature and water, as well as problems arising as a result of tillage, soil compaction and crust formation.

Focus areas:

Soil Survey

This study field involves profile pit observation by drilling mechanical augers and later conducting physical and chemical labora-

tory analyses. The results obtained (also compiled as maps and aerial photographs) are used as vital information for infrastructural planning (urban planning, roads, pipelines, powerlines, etc.) and agricultural management purposes.

Soil Physics and Hydrology

Soil physicists and hydrologists study problems relating to water and soil interaction, soil air permeability, etc.

Soil Chemistry and Fertility

Soil chemistry is concerned with soil nutrient availability and deficiencies using specialised techniques for the purpose of compiling the most effective fertilisation programmes.

Soil Biology

The focus of soil biology is on transformation by means of microorganisms.

Entry requirements for B.Sc. in Soil Science

B.Sc. (Agric.) Soil Science

Mathematics:	4 (50–59%)
Physical Science:	4 (50–59%)
Life Orientation:	4 (50–59%)
English/Afrikaans:	4 (50–59%)
Other languages:	3 (40–49%)

Duration : Four years (full time)

Institution: Most universities

National Diploma (Soil Science)

Mathematics:	4 (50–59%)
Physical Science:	4 (50–59%)
Life Orientation:	4 (50–59%)
English/Afrikaans:	4 (50–59%)
Other languages	3 (40–49%)

Duration: Three years (full time)

Institution: Most universities of technology

Potential employers

Potential employers are the ARC, DAFF (national and provincial), universities, agricultural cooperatives and manufacturers of fertilisers.

Annexure

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