Western Cape Government

Agriculture

Living Agriculture

50 Career Opportunities

Living Agriculture:
50 Career Opportunities

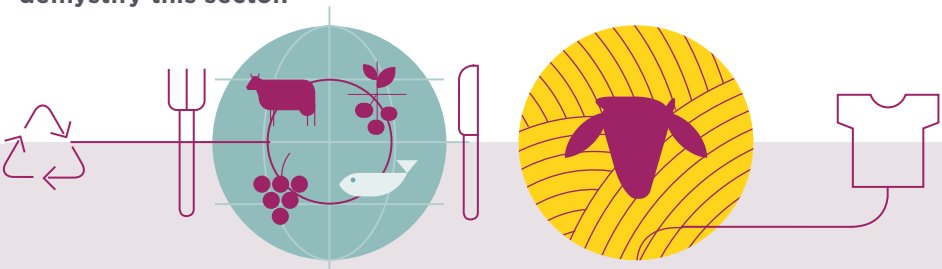
Your one-stop agricultural career booklet

First Edition

Foreword

Joyene Isaacs, Head of Department

The agricultural sector (and value chain) is amazing and remains unexplored by the vast majority of young people. This publication presents exciting agricultural career opportunities to inform and to demystify this sector.



Let me explain why it is amazing and exciting...
Food is a basic in most of our homes. Imagine a world without milk, eggs, beans, meat (all sorts), wheat, wine, fruit and many more - no choices for all of us. The agricultural sector ensures that all the mentioned products are available, either through primary production or through agri processing. Just think of 94 agricultural commodities in the Western Cape Province catering for you and your community's eating preferences, whether based on religion, culture or tradition. You can play your role in ensuring food on the table of this province and even globally.

Clothing – really? Agriculture provides the cotton, the leather, the wool and other natural products to process into the clothing we all wear. Sustainable clothes can be delivered through the agricultural value chain, and again you can play a role. So what are you waiting for?

Agriculture contributes to our day-to-day leisure and lifestyle, leather in luxury cars, farms with accommodation and outdoor activities, protecting the environment for urban dwellers to appreciate and cosmetics (what would we do without our lipstick?).

The opportunities to study in agriculture are endless, because we have to eat, we have to wear clothes and we need to relax. You can influence people's decisions, ensure food security or mental health. The impact of agriculture is thus felt socially, economically and environmentally. Where do you think you fit in?

But the part that makes agriculture exceptional is that the sector presents opportunities for office or field work, for travel, for social interactions, for development, for research, training and education, to mention a few. An agricultural career can cater for persona, interest and aptitude.

Join the agricultural family and you could have a fulfilling career that you enjoy, and make a contribution to food security and other sustainable goals without farming yourself. I reckon the choices are endless, but it starts with reading this publication and making choices based on proper information.

Note by the author

When you page through this book on careers in agriculture, here's a tip: Keep an eye out for the number of careers that are considered a scarce skill. It may surprise you. It certainly surprised me, and showed that there are wonderful career prospects available in this sector for school leavers. Perhaps even more surprising is the number of opportunities available in the sector. Here we've captured 50 of them. But we've only just scratched the surface, and with a little effort, you're likely to find many more opportunities.

The careers listed are diverse in terms of your day-to-day activities: they'll take you from a laboratory, to a game reserve. Or from a courtroom, to a television broadcasting station. These are careers that are also diverse in terms of the skill set required. You could require an eye for detail, or good organisational skills. You might need patience, or the job could require you to have a high-energy personality, and able to think quickly and outside the box. Either way, agriculture proves to be a sector that can be anything you want it to be, with no limits.

So why should you consider a career in agriculture?
Well, if you:

- Like being outdoors, feeling the earth under your feet (or in your hands); or
- Like the detailed perspective needed to collect data, analyse it, and make sense of it; or
- If you like spending time in a lab, doing research, and improving humankind's understanding on a subject; and
- Care deeply for our special South African environment, and want to actively protect it; or
- If you want to simply be an agent of change and improve people's lives, then there's likely one or more careers in this book for you.

This project afforded me the opportunity to meet wonderful people who passionately believe in the sector, and in what they do. Take Dr René Bastian for instance. She trained as a plant biotechnologist, and today works as a Senior Agricultural Advisor, providing extension support to many farmers in the Overberg district. Here she shares her knowledge with both commercial and emerging farmers. And enjoys seeing the difference in these landscapes, and in improving the livelihoods of farmers.

Or take the energetic Jody Wentzel. She became the first woman from the Western Cape Department of Agriculture to successfully be registered as a Professional Engineering Technician at the Engineering Council of South Africa. Her career started off as an accidental entry into the agricultural sector. Today she heads up one of the most important sub-programmes in the department: that of Disaster Risk Management.

Then there's Phophi Sehlakgwe, an agricultural lecturer who takes great joy in watching her students graduate and showcasing the knowledge they've gained on the subjects she teaches.

These are only some of the people in this vibrant sector.

There are many more – all with wonderful, uplifting stories to tell.

A note on how to read this book

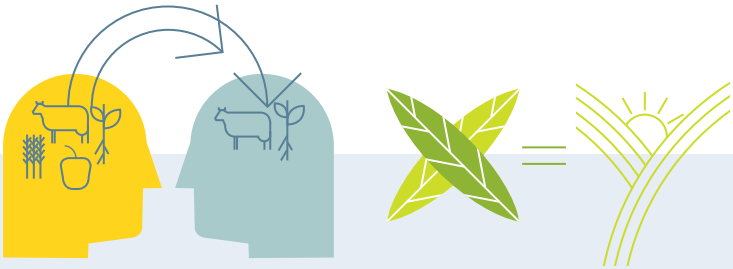
This book is written for school leavers investigating career opportunities that are available in agriculture or young professionals considering a career change. As such, each career listed in this book aims to provide sufficient information to a school leaver to decide whether they would like to consider venturing into a specific career in agriculture.

Each career listed has:

- A **description on what the career entails.**
- A **list of potential employment opportunities**.
- A **list of tertiary institutions where one could study**. Please note: We've worked to include the latest available information from tertiary institutions. But the list provided is by no means exhaustive. What's more, courses change from year to year, and departments change their focus from time to time. Please be sure to investigate the career opportunity with your institution of choice before making a final decision.
- A **list of some of the subjects and themes you may study**. Please note: Each institution offers a unique qualification, including different modules. Be sure to check the course modules at your institution of choice first.
- An **indication of the duration of the qualification**.
- And the **general requirements you would likely need** to meet in order to be accepted at the institution. A final note: These differ from institution to institution. We've used a generic sample of what you're likely to require, but be sure to get the details from your institution of choice.

Final ideas for school leavers

For some degrees, job shadowing is compulsory (for example for veterinary science). However, even if it's not compulsory, it's still a good idea. Spend some time with someone practicing your career of choice – and don't be scared to ask them questions. If this job is to become your career, it's important to make the right choice now. Only you will be able to make this decision, and determine which career will bring you joy.



During the compilation of this book, it became very clear that mathematics and physical science form the backbone of most careers in this sector. These may not be your favourite subjects at school. But should any of these 50 careers (or the hundreds more available in the sector) catch your attention, then it may be a good idea to retain them as your core subjects throughout high school.

South Africa offers numerous tertiary education opportunities. From colleges, to universities and universities of technology, there are many different routes to qualify for the careers listed in this book. This book serves as a guideline – but it's still essential that you do your own homework. Find out more about the institution of your choice, what they offer, their focus on the qualification, whether they offer more theoretical or practical training, and what their minimum entry requirements are.

If you're unsure how you'll find the financial means to study, then do take a look at our bursaries section. There are a number of bursary opportunities – made available by both government and the private sector – for those wishing to follow a career in agriculture (or a related career).

In conclusion, the agricultural sector provides employment to around 850 000 people in South Africa. It's a vital sector – responsible for feeding (and clothing) a nation. The sector may have lost some of its appeal in recent years (for a variety of reasons), resulting in a skills shortage in many of these listed careers. However, that means there are numerous opportunities available now for you to investigate. And this book is a good starting point in what will hopefully become a fulfilling career in a vital sector.

Heather D'Alton

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***** General entry level requirements differ between institutions and qualifications. Please check with your institution of choice to ensure you meet the minimum requirements.

Agricultural Biotechnology

SCARCE SKILL

What does an agricultural biotechnologist do?

Biotechnology is essentially technology based on biology.
An agricultural biotechnologist modifies living organisms (or parts of an organism) in order to improve our lives and health.
A biotechnologist could use traditional breeding techniques to achieve this. Or could manipulate, replace, add or remove specific genes to achieve a chosen outcome. An example of a biotechnologist's work is genetically modified food and antibiotics.

Where could you work?

A biotechnologist's work is research-based, and you could therefore work at any of the research institutions in South Africa, such as the Agricultural Research Council (ARC) or Council for Scientific and Industrial Research (CSIR), as well as at universities. Government departments employ agricultural biotechnologists. In the private sector, there are opportunities within the pharmaceutical sector, food fermentation industry (and brewing companies), dairies, seed companies or private pathologists.

Where can you study?

There are opportunities to study a diploma, a Bachelor's degree, and postgraduate degrees in biotechnology (depending on your institution of choice). A B.Sc., majoring in Microbiology and Botany is another avenue (followed by a postgraduate degree in biotechnology). Institutions include:

- Cape Peninsula University of Technology
- Durban University of Technology
- Rhodes University
- Tshwane University of Technology
- Unisa
- University of Cape Town
- University of Johannesburg
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of the Western Cape
- University of the Witwatersrand

What subjects and themes are you likely to study?

Universities offer a wide variety of undergraduate curricula – but most allow you to major in biotechnology. Other subjects include microbiology and biochemistry. There are also numerous postgraduate opportunities in biotechnology.

What's the duration of the certificate/diploma/degree?

Most degrees majoring in biotechnology are three years.

General entry level requirements to study agricultural biotechnology*:

B.Sc. in Biotechnology

Matric exemption
Mathematics_____5____(60-69%)
Physical science__5____(60-69%)
Biology_____(recommended)

Agricultural Economist

SCARCE SKILL

What does an agricultural economist do?

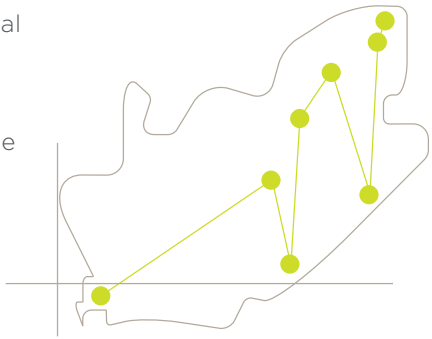
Agricultural economists collect, understand and interpret both local and international economic activities and relate this to how they impact on the agricultural markets. They collect and analyse data within the industry and use the results to advise their stakeholders (like farmers). Their research would also allow them to spot trends and predict economic impacts and market movements. The ultimate goal? To help a 'client'; be it a farmer, a company, policymaker or institution. The information collected by an economist can assist in creating a more stable and efficient working environment.

Where could you work?

You could work as an agricultural economist for government (like the Department of Agriculture) or the private sector – including agricultural companies like food corporations, financial institutions, non-profit organisations and rural development institutions. You could become a lecturer or teacher, sharing your knowledge with others. Aside from local opportunities, you could work internationally as an agricultural economist. This scarce skill is not only used in the agricultural sector; there are also prospects to work in economic development or the financial sector. The opportunities are extremely broad and varied.

Where can you study?

You can study agricultural economics at a number of tertiary institutions:
- North-West University
- University of Fort Hare
- University of KwaZulu-Natal
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda



What subjects and themes are you likely to study?

- Economics and
- agricultural economics are likely to be a major component of your degree.

You could also study subjects such as
- business law and management,
- accounting,
- labour law, and agricultural subjects such as
- agricultural development planning,
- agricultural marketing and
- agricultural policy.

What's the duration of the degree?

You have two options:
1. A B.Sc. Agricultural Economics degree is four years.
2. A B.Com. Agricultural Economics degree is three years.

General entry level requirements to study agricultural economics*:

For a B.Sc. 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%)

One-on-one
with an agricultural economist

Londiwe Thabethe first dreamt of becoming a vet, but after a lab experiment dissecting a not-so-fresh cow carcass, she decided to change course.

> The next option for me was to do agricultural economics – and since then I have never looked back.

Today Londiwe is the Manager: Marketing and Agribusiness within the Agricultural Economics Services Programme of the Western Cape Department of Agriculture. Her division is responsible for helping producers (like farmers) be ready to market and export their products, to facilitate the promotion of agricultural products to exporters, and to provide support to reach compliance required by the markets. "We also facilitate investment into the agricultural sector of the province through our partnership with Wesgro."

Because the tasks are so varied, Londiwe doesn't have time to watch the clock. "No day is ever the same, and that's what is exciting about my job."

Good communication skills are a must

Londiwe obtained her M.Sc. in Agricultural Economics at the University of Pretoria. She says to work in the field, prospective students should have good mathematics, physical science and economics skills.

"To make your work easier, and to support others, you surely need to also be a good communicator, good at looking into the detail, and be able to analyse not only situations, but your work and that of others. Being hardworking is a must, because you deal with so many queries both internally (from the Department of Agriculture) and externally."

She recommends those wishing to follow this career to have qualities such as drive and determination, adaptability and compatibility, compassion and understanding, loyalty, courage and patience. "And being honest and taking responsibility for your actions is important."

No day is ever the same for this agricultural economist

Linking producers to markets

The favourite part of her job? Londiwe enjoys helping producers to add value to their businesses. "For example, during the exhibitions we facilitate, producers or companies get to sign some deals with potential buyers. Our job also entails supporting a producer to be certified as compliant, and then linking him or her to a sustainable market." In order to facilitate this, Londiwe and the Agricultural Economics team are sometimes required to travel to local and international events.

While this is enjoyable, the job can also hold some frustrations for Londiwe: "There is so much need for many of our services, and the resources to help are not always as sufficient as one would like them to be."

Still, she recommends anyone with an interest in the field to consider agricultural economics as a career. Asked whether the job is rewarding, she replies, "Oh yes, definitely. Through the work my team is doing, we are able to make a difference in the lives of those involved in the sector.

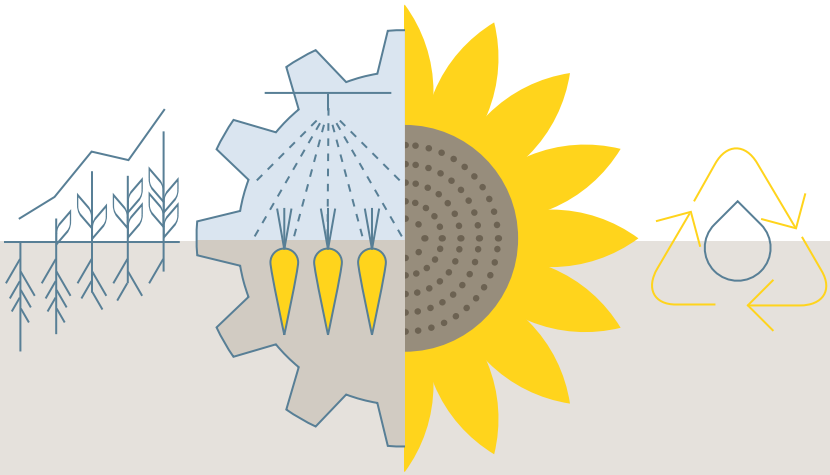
"Also, I get the opportunity to interact with both private and public sector stakeholders at local as well as international level, and get to experience many different perspectives."

Agricultural Engineer

SCARCE SKILL

What does an agricultural engineer do?

Agricultural engineers are problem-solvers in the agricultural sector. They use mechanical, civil and electronic engineering principles to support sustainable agricultural production. The role in essence involves managing these resources (including natural resources) in a sustainable way, to protect them. As an example, an agricultural engineer could design gabion structures to protect eroded rivers. Or they could design machinery to improve production, or irrigation systems for nurseries.



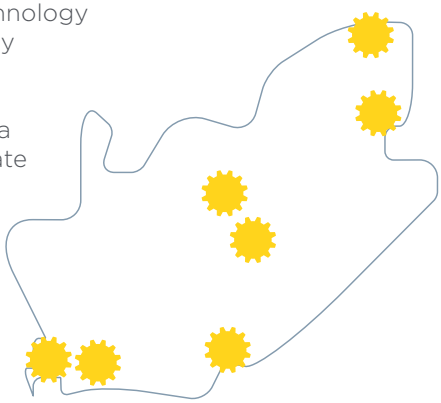
Where could you work?

These engineers often work in consultancy roles (either for a company or self-employed) – and are drafted in to support farmers or others working in the sector. There are opportunities in the research and academic world as a lecturer. Agricultural engineers can be appointed to work for national and provincial agricultural departments. And in many instances, manufacturing and food companies require these skills to find innovative agricultural solutions to challenges.

Where can you study?

A national diploma or Bachelor's degree are potential launch pads into a career as an agricultural engineer. These institutions offer related diplomas or degrees:

- Cape Peninsula University of Technology
- Central University of Technology
- Nelson Mandela University
- Unisa
- University of Cape Town
- University of Mpumalanga
- University of the Free State
- University of Venda



What subjects and themes are you likely to study?

Depending on your institution of choice, and your course of choice, subjects could include agricultural management, computer applications (agriculture), agricultural engineering and agricultural production techniques, among others.

What's the duration of the certificate/diploma/degree?

National diplomas are in most instances three-year programmes, while degrees majoring in agricultural engineering are in most instances four-year programmes.

General entry level requirements to study agricultural engineering*:

B.Sc. Agriculture majoring in Agricultural Engineering:

Mathematics:_____5____(60-69%)
Life science:_____5____(60-69%)
Physical science:_____5____(60-69%)
Agricultural science:_____5____(60-69%)
Language of instruction:___4____(50-59%)

One-on-one with an agricultural engineer

For Jody Wentzel, a career in agriculture has been a “marvelous accident”. Jody thought she would end up working in construction; specifically housing. Today, however, she runs the Disaster Risk Management sub-programme at the Department of Agriculture, Western Cape – a job that combines her engineering training and her agricultural experience.

Jody shoulders considerable responsibility in her role: she manages a budget of around R500-million. And this has to be allocated to those most in need as a result of a natural disaster affecting the agricultural sector in the Western Cape.

> I know how desperately those affected need the funds – they need any form of help and relief. Therefore, we need to be diligent in our work and honest as we are working with state funds. In that way we are really helping people.

Her role entails coordination. She oversees her team of five people, and she liaises with experts in the field to ascertain the support required. She compiles data in detailed reports on the disaster, presents these to the national departments to request funding, and compiles progress reports on funds spent.

A non-stop job

And it can get rather busy. She says, "It can be non-stop. When I started, we experienced a five-year drought that impacted on agriculture tremendously. There were two flood projects running at the same time. We were dealing with the after-effects of two major fires, as well as Avian flu and other pests such as the Polyphagous Shot Hole Borer breakout." That's also her favourite part of the job: "You never know what's going to happen next. There are a lot of unknowns, so to do this job, you need to be the type of person who can think outside the box. You need to have high energy and communicate easily with people. And you need to be able to stand your ground."

Helping people in times of natural disaster

Jody also believes negotiation skills are important in her field. "You have to convince people that they need to do something and show them why it's important. So it's good to be practical and technical. You should also be good at mathematics and literature. And physical science is advantageous."

The first ECSA-registered woman from the Department

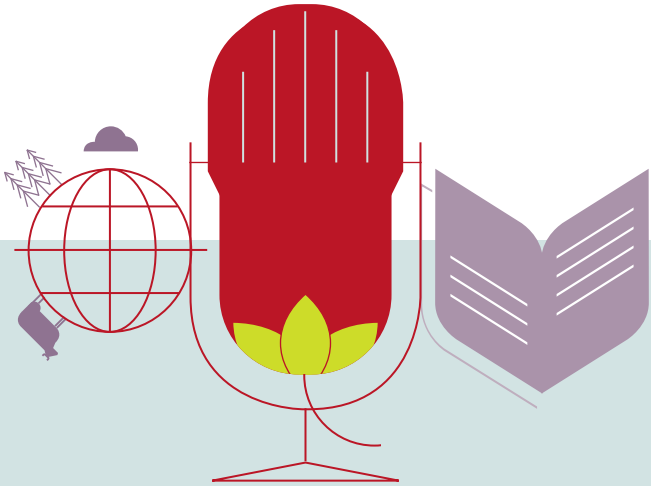
She acquired those skills by completing a National Diploma in Civil Engineering from the Cape Peninsula University of Technology (here she was awarded a bursary from the Department of Agriculture). And then she obtained her B.Tech., majoring in Urban Engineering, also from CPUT. She also became the first woman in the Western Cape Department of Agriculture to be registered as a Professional Engineering Technician at the Engineering Council of South Africa (ECSA) – and that at the tender age of 31. Her experience designing and managing the installation of flood structures and drainage works, working for the LandCare sub-programme as a Candidate Engineering Technician, also set her up for her current role. Aside from her training and experience, much depends on her positive attitude. "When a disaster hits, people are negative and sad. So you need to remain positive. You need to show them how we're going to try and work things out and make things better."

Agricultural Journalism/Communication

What does an agricultural journalist or communicator do?

An agricultural journalist reports (gathers and packages information) on topics and themes related to agriculture.

This is a niche sector for which you would usually need agricultural knowledge. If you work in the communication field, you would assist to market and sell an agricultural product or a message as well as share information relating to research findings or news stories within agriculture. This also requires specialised knowledge of the sector.



Where could you work?

There are opportunities to work for a magazine such as Farmer's Weekly or Landbouweekblad, for newspapers that report on agricultural topics, for internet-based companies, or for several agricultural television or radio stations and shows e.g. RSG Landbou and Die Kwik Styg. There are a number of different career options in this field, for example science writer, broadcaster, presenter, producer, communication specialist or public relations specialist. As a communication or public relations specialist, you could work for government within national or provincial agricultural departments, for an agricultural company, or for a consultancy that delivers communications services to the sector.

Where can you study?

It's suggested you study a journalism or communication diploma or degree, and then specialise in agriculture to obtain knowledge of the sector. Institutions include:

- Cape Peninsula University of Technology
- Durban University of Technology
- Nelson Mandela University
- Rhodes University
- Tshwane University of Technology
- Unisa
- University of Fort Hare
- University of Johannesburg
- University of KwaZulu-Natal
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of the Witwatersrand

What subjects and themes are you likely to study?

Subjects will differ between a journalism and a communication diploma or degree. If you study journalism, you're likely to have themes such as writing and editing, communication design, television, photojournalism and radio.

What's the duration of the certificate/diploma/degree?

Both a diploma and a degree are three-year programmes at most institutions.

General entry level requirements to study journalism or communication*:

English, Afrikaans or isiXhosa:__4____(50-59%)
Mathematics:_____2____(30-30%) OR
Mathematical literacy:_____3____(40-49%)

Agricultural Law/Lawyer

SCARCE SKILL

What does an agricultural lawyer do?

An agriculture lawyer is a lawyer who has specialised in providing support – mostly to farmers – on matters relating to agriculture.

Your area of expertise could include commercial law, advice on agricultural credit and financing, developing contracts for farmers, advice and setting up contracts for farmers, advice on water regulations and labour law, advice on veld and forest fire regulation and other environmental regulations, intellectual property, land use and zoning expertise and patents (for example, on genetically modified products). You should also have expertise in the law of succession such as trusts and wills.

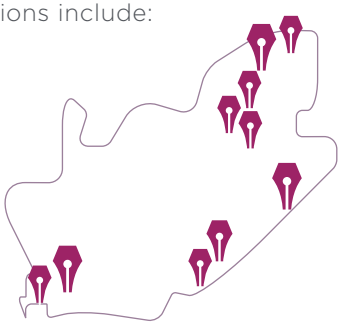
Where could you work?

You could work for a law firm that services the farming or agricultural community or sector. Government departments also make use of this expertise, as do research and academic institutions. Private companies normally invest in an in-house legal expert(s) to safeguard their interests, and draw up contracts and policies (and create the correct legal frameworks).

Where can you study?

It's suggested you first obtain an LLB (Bachelor of Law) degree before specialising in agriculture. Institutions include:

- Rhodes University
- Unisa
- University of Cape Town
- University of Fort Hare
- University of Johannesburg
- University of KwaZulu-Natal
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of Venda
- University of the Witwatersrand



What subjects and themes are you likely to study?

This depends on your institution of choice. You could study subjects such as constitutional law, law of succession, law of property, law of persons and family, corporation law, civil procedure and labour law.

What's the duration of the degree?

The LLB is a four-year programme at most institutions.

General entry level requirements to study law*:

Many institutions require you to first write a national benchmark test in order to be considered for the degree.

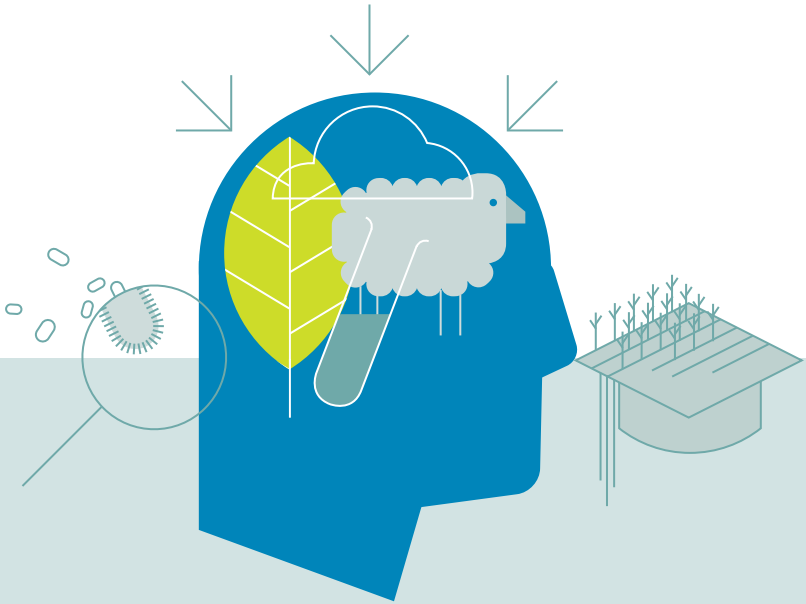
Depending on your institution of choice, you're likely to require:
National Senior Certificate average of at least:_____70%
English/Afrikaans (Home language):_____5____(60-69%) OR
English/Afrikaans (First additional language):_____6____(70-79%)

Agricultural Lecturer

What does an agricultural lecturer do?

An agricultural lecturer educates undergraduate and postgraduate students in specific agricultural-related fields.

Your task is to prepare and groom these young people for a career in agriculture.



Where could you work?

Agricultural lecturers could work at any of the country's tertiary institutions (universities, colleges or other training institutes) that offer an agricultural curriculum.

Where can you study?
This depends on the field of agriculture you choose to specialise in. For example, if you choose to become an Agricultural Engineering Lecturer, you would need to obtain a Bachelor's degree in that field. A senior lecturer is likely to require a doctorate.

What subjects and themes are you likely to study?
This depends on your degree or diploma of choice. For example, a Bachelor of Science in Agriculture could include a broad range of subjects such as
- biology,
- environmental science and
- chemistry,

and more specific subjects such as
- agricultural extension,
- water management and
- applied entomology.

What's the duration of the certificate/diploma/degree?
A Bachelor of Science in Agriculture is a four-year programme at most institutions.

General entry level requirements to study agricultural lecturing*:
Mathematics:_____4____(50-59%) OR
Mathematical literacy:_____6____(70-79%)
Life science:_____4 ____(50-59%)
English:_____4____(50-59%)

One-on-one with an agricultural lecturer

In order to become an agricultural lecturer, you must have a passion for teaching young people. So says Phophi Sehlakgwe, Agricultural Lecturer at the Elsenburg Agricultural Training Institute in the Western Cape.

> If you don't have a passion for teaching, you won't survive. There's a lot of hard work behind closed doors. You have to come to the lessons prepared, and you must find the time to prepare.

Still, Phophi really enjoys the work, especially spending much of her time outside in her demonstration plots. She teaches vegetable production to third-year students. "I therefore spend time with students at the plots – taking them through the process from planting to harvest. So there is a lot of practical required." A smaller percentage of her time is spent teaching the theory in the classroom.

Good administrative skills are vital

She says that while mathematics and IT skills are important for her job, organisational skills should not be underestimated. "These are not taught at school, but you must have good organisational and administrative skills." Her job, for example, requires her to liaise on the purchasing of all the inputs needed for practical classes. She also marks papers and moderates a number of modules.

Phophi obtained her B.Sc. in Agriculture from the University of South Africa (Unisa) and went on to complete her Master's degree in Agriculture at Unisa in 2017. It was while she worked as a student assistant in 2010 that she realised how much she enjoyed interacting with students. That set her on her new career path, becoming a junior lecturer in the Department of Agriculture and Environmental Sciences at Unisa. She was promoted to lecturer in 2013, teaching in vegetable production, soil fertility and plant diseases.

The importance of imparting skills in agriculture

While she first studied agriculture before becoming a lecturer, she recommends prospective lecturers also obtain a teaching qualification. She regularly attends courses and workshops in teaching to continuously hone her skills and notes her appreciation to the Department of Agriculture and Elsenburg for supporting her teaching career.

A rewarding job opportunity

Phophi says the most rewarding part of her job is when her students graduate. "Especially when you know you've taken them through the course, and they know the subject well, and they come up and say thank you."

The most important part, she believes, is imparting agricultural skills. "Agriculture is very important, even though our government seems to prioritise other departments above agriculture in terms of budget allocations. But without agriculture, there is no food. This is the way forward in South Africa. That's why we need skilled lecturers and skilled workers. It's crucial to have skills in this sector."

Agricultural Technical Services

SCARCE SKILL

What does an agricultural technician do?

Agricultural technicians help improve a farm's productivity.

This is achieved through research, assessments, experiments and analysis. Data collection (used by agriculturists) is an important activity of an agricultural technician. In South Africa, there are three kinds of technicians:

- Agricultural resource technicians (assisting the resource officer to classify and describe the region's natural resources).
- Agricultural extension technicians (assisting extension officers to collect data to help farmers).
- Agricultural research technicians (working closely with researchers – assisting them to collect the necessary data).

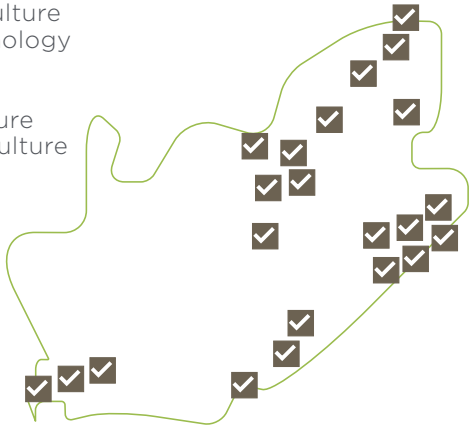
Where could you work?

You could work for government departments, such as the national Department of Agriculture, Land Reform and Rural Development, or provincial agricultural departments. Research institutes such as the Council for Scientific and Industrial Research (CSIR) require these skills, as do agricultural cooperatives.

Where can you study?

You could enrol for a certificate, diploma or a Bachelor's degree in Agriculture in order to qualify to become an agricultural technician. Institutions include:

- Cape Peninsula University of Technology
- Cedara College of Agriculture
- Coastal KZN TVET College
- Elangeni TVET College
- Elsenburg Agricultural Training Institute
- Fort Cox Agriculture and Forestry Training Institute
- Madzivhandila College of Agriculture
- Mangosuthu University of Technology
- Nelson Mandela University
- North-West University
- Owen Sitole College of Agriculture
- Potchefstroom College of Agriculture
- Taletso TVET College
- Umfolozi TVET College
- Unisa
- University of Fort Hare
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda
- University of Mpumalanga
- Vuselela TVET College



What subjects and themes are you likely to study?

You would be expected to successfully complete a wide array of subjects related to agriculture before you qualify as an agricultural technician. These could include: plant production, pasture science, animal production physiology, agricultural production techniques, farm management, soil fertility and more.

What's the duration of the certificate/diploma/degree?

You could obtain a Certificate in Agriculture (it takes two years to complete the Higher Certificate at the Elsenburg Agricultural Training Institute), followed by a one-year Diploma (in Agriculture or Extension). Or complete a B.Sc. Agric degree, which is a three-year degree.

General entry level requirements to study agricultural technical services*:

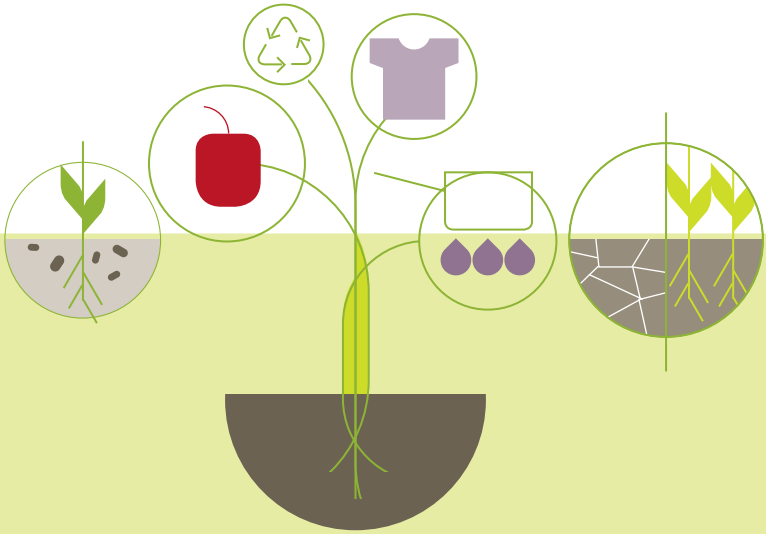
Mathematics:_____4____(50-59%)
AND Physical science:___4 ____(50-59%) OR
Life science:_____4 ____(50-59%) OR
Agricultural science_____4 ____(50-59%)
English/Afrikaans:_____4 ____(50-59%)
Other languages:_____3 ____(40-49%)

Agronomy

What does an agronomist do?

Agronomists search for ways to cultivate, alter (genetically) and use plants to benefit humankind – without damaging the environment.

In most cases, agronomists work to improve the quality of plants produced, as well as the quantity, while preserving the soil's natural state. This involves the use of practices such as Conservation Agriculture. Agronomists can work on any crop of choice as this is a skill that is crosscutting and relevant to all crops. In South Africa, agronomists could work on crops such as grain (e.g. maize, sorghum, wheat and barley), sunflowers, vegetables (such as potatoes and tomatoes), forage crops and more.



Where could you work?

There are opportunities for agronomists to work in government departments (such as the Department of Agriculture, Land Reform and Rural Development). You could use your expertise working for tertiary institutions, like universities (as a lecturer or researcher) or research institutions. In the private sector, there are opportunities within businesses such as fertiliser manufacturers or any other company that supplies agricultural products and services.

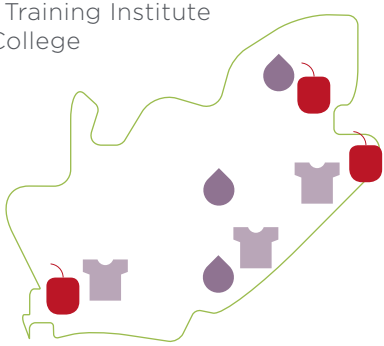
Where can you study?

A Bachelor of Science degree, majoring in Agronomy, is offered at:

- Fort Hare University
- Unisa
- University of the Free State
- University of KwaZulu-Natal
- University of Mpumalanga
- University of Pretoria
- University of Stellenbosch
- University of Zululand

Or specialise in Agronomy, as part of a Diploma in Agriculture:

- Elsenburg Agricultural Training Institute
- Fort Cox Agricultural College



What subjects and themes are you likely to study?

You will gain an overview of the production and management of various crops. Major subjects include introduction to crop science, soil science, farm selection and planning, horticultural science (pre and post-harvest management), plant nutrition, production practices, agricultural biometry, plant breeding, advanced crop science, irrigation management as well as pest and disease management in crops.

What's the duration of the certificate/diploma/degree?

This is a four-year degree at most institutions. Some training colleges offer a Diploma with Agronomy as a major (a three-year programme).

General entry level requirements to study agronomy*:

English/Afrikaans (or First additional language):_____4 ___(50-59%)
Mathematics:_____5 ___(60-69%)
Physical science:_____4 ___(50-59%)

Animal Geneticist

What does an animal geneticist do?

An animal geneticist studies why animals behave in certain ways by looking at their genetic make-up or "biological building blocks".
They could look at why a specific gene allows an animal to thrive in a specific environment. Or how an animal is immune to a certain disease. Geneticists can use this knowledge to improve selection decisions, or to better understand an animal's resistance to disease, as an example. Geneticists also have to be able to communicate their findings well.

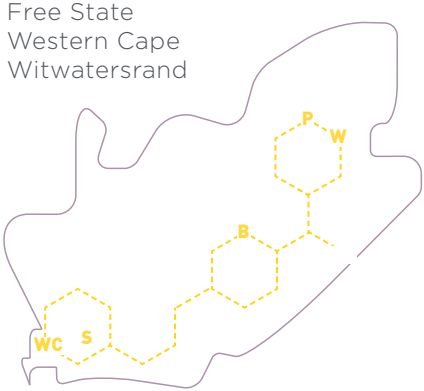
Where could you work?

Animal geneticists could work at research, academic institutions, or zoos. Opportunities exist in government, working for the Department of Agriculture nationally or provincially. In the private sector, animal geneticists are employed at agribusinesses, animal production facilities or in the pharmaceutical industry.

Where can you study?

A B.Sc. in Agriculture, majoring in Genetics is one avenue for animal geneticists. For some of these careers, a Masters or even a Doctorate in Genetics is advised.

- Unisa
- University of KwaZulu-Natal
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of the Western Cape
- University of the Witwatersrand



What subjects and themes are you likely to study?

Should you opt for a B.Sc. in Agriculture, majoring in Genetics, then subjects could include biology, chemistry, biochemistry, biometry, genetics and soil science.

What's the duration of the certificate/diploma/degree?

A B.Sc. in Agriculture, with Genetics as a major is a four-year programme at most institutions.

General entry level requirements to study animal genetics*:

Mathematics:_____5 ____(60-69%)
Physical science:_____4 ____(50-59%)
English/Afrikaans:_____4 ____(50-59%)

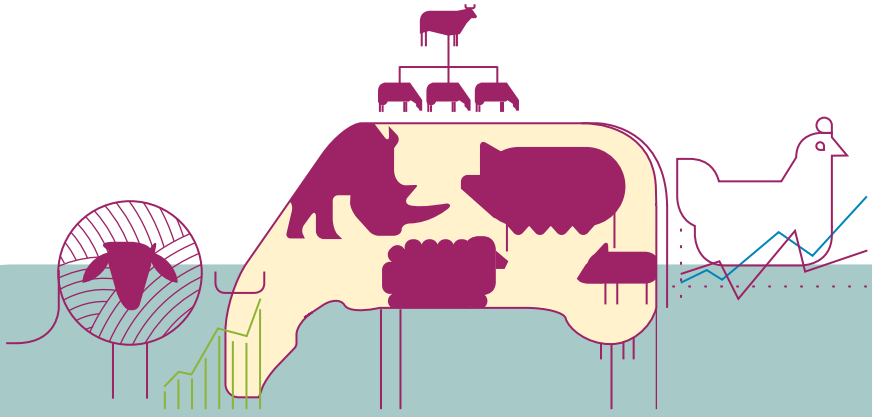
Animal Scientist

SCARCE SKILL

What does an animal scientist do?

An animal scientist deals with a broad range of activities around animal production and animal products.

It includes animal husbandry (for example the day-to-day care of animals, breeding, nutrition and the raising of livestock), as well as animal-based products (such as milk and dairy products, eggs, meat and wool). An animal scientist doesn't only work with domestic livestock; the job entails working with wildlife species too.



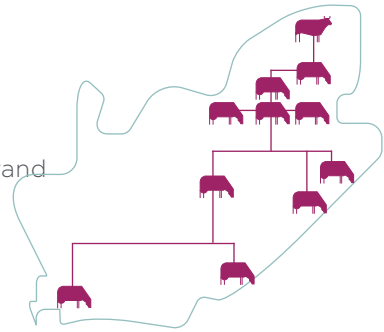
Where could you work?

An animal scientist could specialise in several fields and could therefore work in one of many industries. Career opportunities exist in the private sector (the pharmaceutical industry, feed industry, animal products or animal husbandry industries and for artificial insemination companies). Research and academic institutions require these skills. Or you could work for national or provincial government departments, conservation authorities, or for agricultural development institutions.

Where can you study?

The South African Society for Animal Science recommends obtaining a B.Sc. in Agriculture degree with Animal Science as a major (in order to be recognised professionally). You can then register at the South African Council of Natural Science Professions. Some colleges may offer a related diploma:

- North-West University
- Tompi Seleka College of Agriculture
- Tshwane University of Technology
- Unisa
- University of Fort Hare
- University of KwaZulu-Natal
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda
- University of the Witwatersrand
- University of Zululand



What subjects and themes are you likely to study?

This will depend on your institution of choice, but could include themes such as animal anatomy and animal physiology, animal breeding, management and nutrition.

What's the duration of the certificate/diploma/degree?

A B.Sc. in Agriculture with Animal Science as a major is a four-year programme at most institutions. A Diploma in Animal Science is a three-year programme.

General entry level requirements to study animal science*:

Mathematics:_____5 ____(60-69%)
Physical science:_____5 ____(60-69%)
Life science:_____5 ____(60-69%)
Agricultural science:_____5 ____(60-69%)
Language of instruction: __4 ____(50-59%)

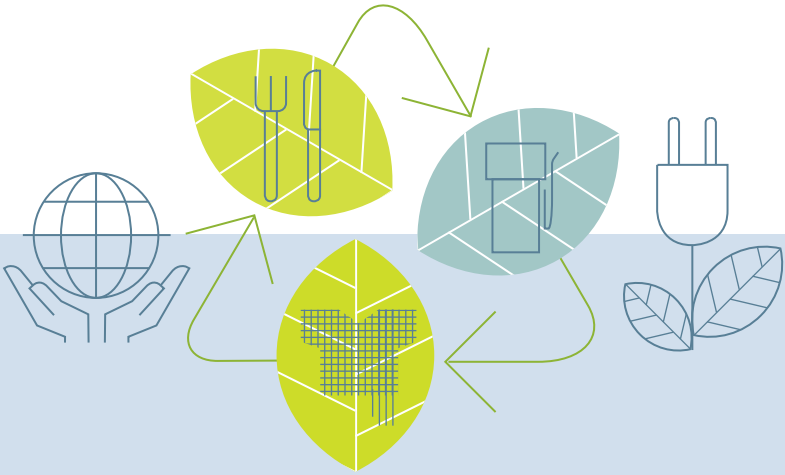
Bioresource Engineering

SCARCE SKILL

What does a bioresource engineer do?

A bioresource engineer uses engineering principles to (sustainably) use and/or enhance our global natural resources.

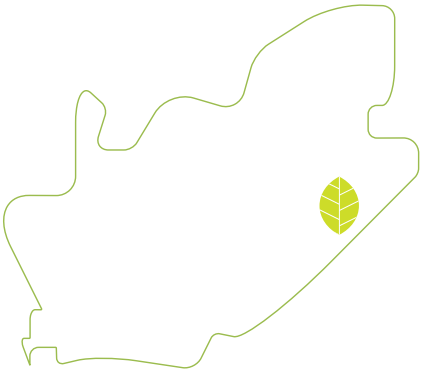
It's a career that integrates engineering, design and the biological sciences. Essentially, you will be able to optimise the manufacture of products using the earth's natural resources sustainably. For instance, you could use natural non-wood products to make paper; or convert biomass into ethanol.



Where could you work?

Your options are broad when you work as a bioresource engineer, including research, development, project management, enterprise development and more. You could work in the forestry sector, in food processing, water resource management or waste management, rural development, machinery development or agricultural vehicles and systems. There are also career opportunities in the public sector, such as the Department of Agriculture or agricultural research institutes. Or if you work in the private sector, there are employment prospects at food processing companies, agricultural equipment manufacturers, or as bioresource engineering consultants.

Where can you study?
Only the University of KwaZulu-Natal currently offers a Bioresource Engineering degree.



What subjects and themes are you likely to study?
Subjects include: water resource management (drought and floor planning, water quality, irrigation and drainage and dam design), food fibre production engineering and environmental engineering (which includes soil conservation, animal waste management and animal-friendly building and devices).

What's the duration of the certificate/diploma/degree?
This is a four-year degree.

General entry level requirements to study bioresource engineering*:
Mathematics:_____6 ____(70-79%)
Physical science:_____6 ____(70-79%)
Life orientation:_____4 ____(50-59%)
English:_____4 ____(50-59%)
Three other subjects:___4 ____(50-59%)

Entomology

SCARCE SKILL

What does an entomologist do?

Entomology is the study of insects and how they relate to the environment and to humans.

An entomologist's contribution could include finding better ways to pollinate crops, or to protect crops (and trees and wildlife) against threatening pest species as well as identifying beneficial insects for a balanced ecosystem. Entomologists may specialise as agricultural entomologists, veterinary entomologists, medical entomologists and more. Entomologists often test pesticides on new cultivars to see the resistance level of certain products/ cultivars prior to being released to farmers.

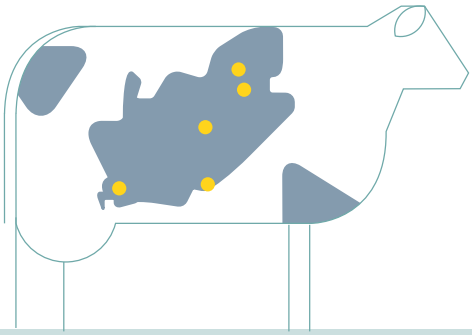
Where could you work?

Entomologists can work in a range of sectors, e.g. in agriculture, as quarantine officials, insect pest management specialists, in insect-rearing laboratories, as environmental consultants, or even in criminology and forensics. The Department of Agriculture, research agencies, tertiary institutions, private agri-businesses, seed production companies and non-profit organisations all require these skills.

Where can you study?

These tertiary institutions offer a degree/diploma with a major in Entomology:

- Rhodes University
- Unisa
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of the Witwatersrand



What subjects and themes are you likely to study?

Some of the subjects would include (depending on the institution of your choice):

- chemistry,
- plant biology,
- genetics,
- microbiology,
- cell biology,
- physics and
- animal diversity.

What's the duration of the certificate/ diploma/degree?

This is a three-year undergraduate degree.

General entry level requirements to study entomology*:

For a B.Sc. Entomology:

Mathematics:_____4_____(50-59%)
Physical science:__4_____(50-59%)
Life orientation:___4_____(50-59%)
English/Afrikaans:_4_____(50-59%)
Other languages:_3_____(40-49%)

Extension Officer

SCARCE SKILL

What does an extension officer do?

Extension officers are really educators (in a non-formal sense). As an extension officer, your job is to educate your target group on relevant knowledge, developments, technology, opportunities, risks and so forth. Target groups could be farmers, private companies or any other group that works in the sector (this group could be responsible for protecting natural resources, growing these resources, or sustainably using them). Extension officers could also research farming products and methods, working with scientists and farmers.

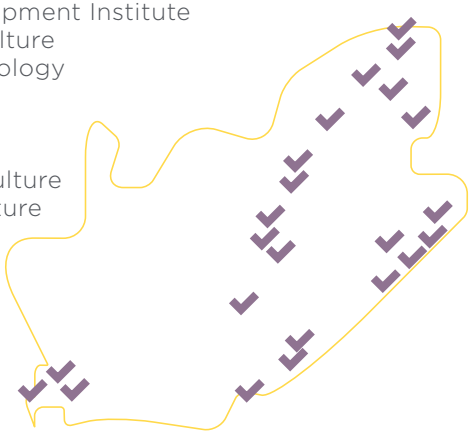
Where could you work?

Agricultural extension officers are often employed in the public sector, working for government departments to assist farmers. Extension officers can also work in the private sector, for companies such as consulting firms, fertiliser manufacturers, non-profit organisations or for cooperatives.

Where can you study?

There are a range of certificates, diplomas and degrees available for those wishing to study agricultural extension. Some provincial Departments of Agriculture do require extension officers to have a Bachelor's degree (B.Agric, B.Sc. in Agric or B.Tech. in Agric). They may also require extension officers to be registered with the South African Council for Natural Scientific Professions.

- Cape Peninsula University of Technology
- Cedara College of Agriculture
- Central University of Technology
- Elsenburg Agricultural Training Institute
- Fort Cox College of Agriculture and Forestry
- Glen College of Agriculture
- Grootfontein Agricultural Development Institute
- Madzivhandila College of Agriculture
- Mangosuthu University of Technology
- Nelson Mandela University
- North-West University
- Owen Sitole Agricultural College
- Potchefstroom College of Agriculture
- Tompi Seleka College of Agriculture
- Unisa
- University of Fort Hare
- University of KwaZulu-Natal
- University of Limpopo
- University of Mpumalanga
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda
- University of Zululand



What subjects and themes are you likely to study?

This depends on the academic institution you attend. Subjects could include agricultural economics for extension, behaviour change, animal production, plant production and project planning.

What's the duration of the certificate/diploma/degree?

There are numerous options, from a one-year Diploma in Extension (Elsenburg Agricultural Training Institute) to three and four-year Bachelor degrees in Agriculture.

General entry level requirements to study agricultural extension*:

For a **Bachelor's degree majoring in Agricultural Extension**, you could require:
English/Afrikaans:____4_____(50-59%)
Mathematics:_____5_____(60-69%)
Physical science:_____4_____(50-59%)

One-on-one with an agricultural advisor

For Dr René Bastian, working as a Senior Agricultural Advisor for the Western Cape Department of Agriculture is very rewarding. René provides extension support to farmers.

> I love this, because you can see the change you make in the lives of the farmers. Because of your assistance in giving advice and training, you can see an increase in livelihoods, and in food security. That's what I get out of it.

René started working in a very different career. She completed a B.Sc. and later her Doctorate in Plant Biotechnology, and then worked in a laboratory at the University of the Western Cape. Following a move to the Overberg, she joined the department in 2014 as an extension officer. She also completed her Master's in Sustainable Agriculture at the University of the Free State.

Today she can use all these skills to provide advice to farmers. “We don’t just provide technical advice. We regularly visit farmers to do monitoring and evaluation of projects. We help them deal with problems.”

Supporting emerging farmers

Developing emerging farmers is a focus area for the department. “Our role is to make sure there’s a developing emerging farmer sector, and that there’s an increase in livelihoods especially in the rural communities. We do this through knowledge transfer and capacity building.”

Support includes developing farm plans and farm assessments for farmers, facilitating training where needed, and helping farmers apply for funding to the department. René also uses these opportunities to promote conservation agriculture with her stakeholders. While there are numerous certificates and diplomas, which include agricultural extension modules, René recommends obtaining a Bachelor’s degree in Agriculture or a related field. In her department, all extensions officers must be registered with the South African Council for Natural Scientific Professions (SACNASP).

Changing the lives of farmers: a rewarding career in extension

Good social skills needed

She says school leavers will benefit if they have mathematics, science and biology as subjects. She adds, “You must have an idea of economics, because you’re helping with markets and budgets.” And given the report writing required, strong literacy skills are important.

Aside from this, good social skills are essential. She says, “Sometimes extension officers don’t realise how important this is. You must be able to retain relations with farmers and other stakeholders within the agricultural industry. You must recognise that people differ, and respect them all as individuals.”

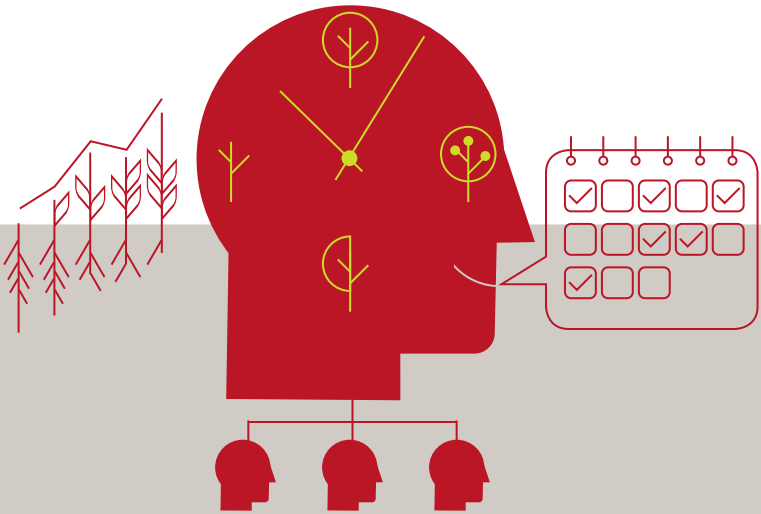
Farm Manager

SCARCE SKILL

What does a farm manager do?

A farm manager is responsible for the running of the farm.

Depending on your employer, this could include the actual planning of the farm's activities (over the longer term), as well as the daily activities, supervising and organising your team and implementation of the activities (for example, harvesting the crop on the farm). It could also include the administrative and financial side of running a farm, such as budgeting, keeping financial records, human resources, keeping administrative records and even marketing farm products.



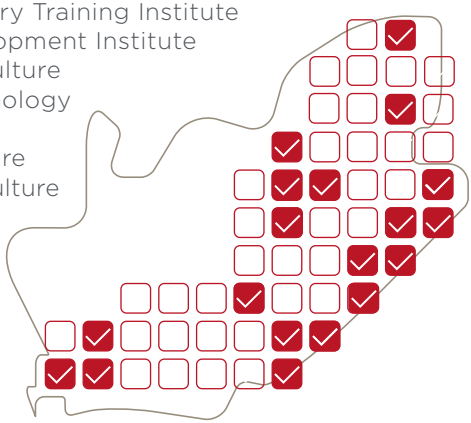
Where could you work?

In most instances, you're likely to work on a farm. But there are numerous kinds of farms you could choose from, for example, a grain farm, livestock farm or wine farm. There are also opportunities on research farms belonging to research or academic institutions. Or you could become a lecturer at agricultural colleges or join farm management consultancy firms.

Where can you study?

There are numerous universities and colleges that offer certificates, diplomas and even Bachelor's degrees, with modules relating to farm management. These include:

- Boland College
- Cape Peninsula University of Technology
- Cedara College of Agriculture
- Central University of Technology
- Coastal KZN TVET College
- Elangeni TVET College
- Elsenburg Agricultural Training Institute
- Fort Cox Agriculture and Forestry Training Institute
- Grootfontein Agricultural Development Institute
- Madzivhandila College of Agriculture
- Mangosuthu University of Technology
- Nelson Mandela University
- Owen Sitole College of Agriculture
- Potchefstroom College of Agriculture
- Taletso TVET College
- Umfolozi TVET College
- Unisa
- University of Fort Hare
- University of Mpumalanga
- Vuselela TVET College



What subjects and themes are you likely to study?

Depending on the institution or qualification you choose, subjects could include: farm management, financial management, data management, plant nutrition, applied farming techniques, and dairy, vine and mutton production.

What's the duration of the certificate/diploma/degree?

Many diplomas, degrees and certificates require a practical element. So in some instances, the theoretical study is one to two years, followed by a year or a year and a half of practical experience.

General entry level requirements to study farm management*:

Grade 12 or any other equivalent qualification.

Farmer

What does a farmer do?

A farmer takes on the extremely important task of feeding a nation. Without farmers, the world could not survive. Farmers grow and produce a variety of crops, such as grain, vegetables or fruit; or they raise livestock. To be a farmer, you are likely to also manage people, and manage your finances and budget, and in some cases, market your product. There are a range of types of farmers. In South Africa specifically you could farm with grain, maize, livestock (sheep, cattle or chickens), vegetables or fruit, dairy and vineyards, among others. There is also a growing trend to be an organic farmer.

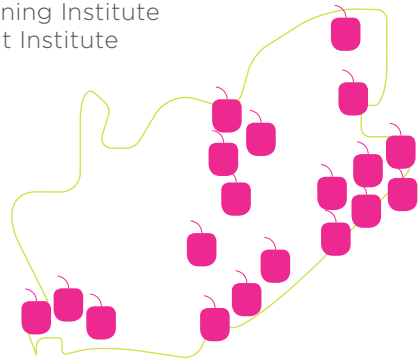
Where could you work?

Farmers would generally work on their own farms or on communal land. In South Africa, there is currently a focus on making land available for emerging farmers. In many of these instances, these farmers will cultivate or manage land owned by government – but with whom they have signed a lease agreement.

Where can you study?

There are numerous universities and colleges that offer certificates, diplomas or even Bachelor's degrees that will provide the basics of farming. You may need to specialise subsequently in the field of your choice. And much training is likely to take place on the job. Some institutions to consider include:

- Boland College
- Cape Peninsula University of Technology
- Cedara College of Agriculture
- Central University of Technology
- Coastal KZN TVET College
- Elangeni TVET College
- Elsenburg Agricultural Training Institute
- Fort Cox Agriculture and Forestry Training Institute
- Grootfontein Agricultural Development Institute
- Madzivhandila College of Agriculture
- Mangosuthu University of Technology
- Nelson Mandela University
- Owen Sitole College of Agriculture
- Potchefstroom College of Agriculture
- Taletso TVET College
- Umfolozi TVET College
- Unisa
- University of Fort Hare
- University of Mpumalanga
- Vuselela TVET College



What subjects and themes are you likely to study?

This depends on the institution or qualification you choose. However, subjects could include farm management, financial management, data management, plant nutrition, applied farming techniques, and dairy, vine and mutton production.

What's the duration of the certificate/diploma/degree?

In some instances, the theoretical study is one to two years, followed by a year or a year and a half of practical experience.

General entry level requirements to study to become a farmer*:

Grade 12 or any other equivalent qualification.

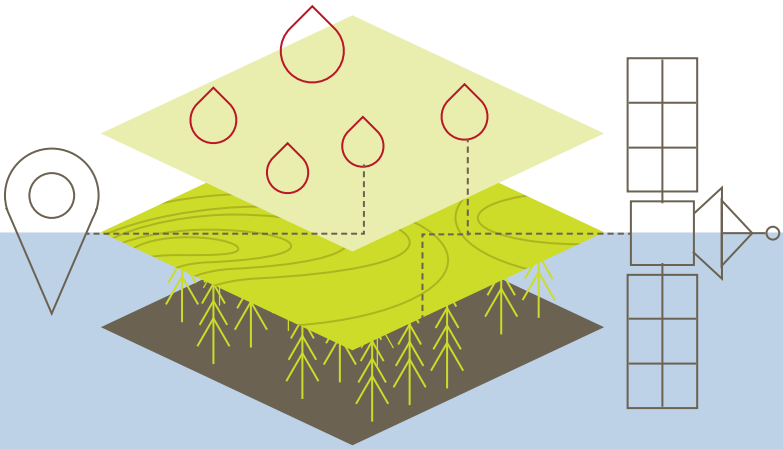
Geographic Information Systems (GIS) Technology

SCARCE SKILL

What does a GIS technologist do?

A Geographic Information Systems (GIS) technologist uses computer software to collect, manage, analyse, present and store geographical and spatial data.

In the agricultural sector, for example, you could layer information on fires – such as wild fire, controlled burns, natural vegetation that could still burn, and areas that would be threatened in the case of a wildfire. This information could be vital in managing and preventing wildfires in future. A GIS technologist therefore plays a key role as a problem solver using spatial analysis.



Where could you work?

GIS technologists work across a range of sectors – such as the conservation sector, government departments (or municipalities and cities), tertiary institutions or the private sector (for engineering, mining, forestry or transport companies).

Where can you study?

For a career as a GIS technologist, you're encouraged to study a B.Sc. in Geoinformatics or Surveying or a B.Tech. or National Diploma in Surveying or Cartography. It's compulsory to register with the South African Geomatics Council in order to offer GIS services as a professional. Some of the institutions listed below may also present GIS short courses, although on completing the short course, you will not be able to register with the Council as a professional (although you will be in a position to work with a registered professional).

- Cape Peninsula University of Technology
- Durban University of Technology
- Esri South African College
- Mangosuthu University of Technology
- Nelson Mandela University
- North-West University
- Rhodes University
- Tshwane University of Technology
- Unisa (introductory module)
- University of Cape Town
- University of Johannesburg
- University of KwaZulu-Natal
- University of Pretoria
- University of Stellenbosch
- University of the Free State

What subjects and themes are you likely to study?

While mathematics and physics are likely to be included in your degree, subjects such as geography, GIS and remote sensing, geography and environmental studies, environmental geochemistry and geology could be offered.

What's the duration of the certificate/diploma/degree?

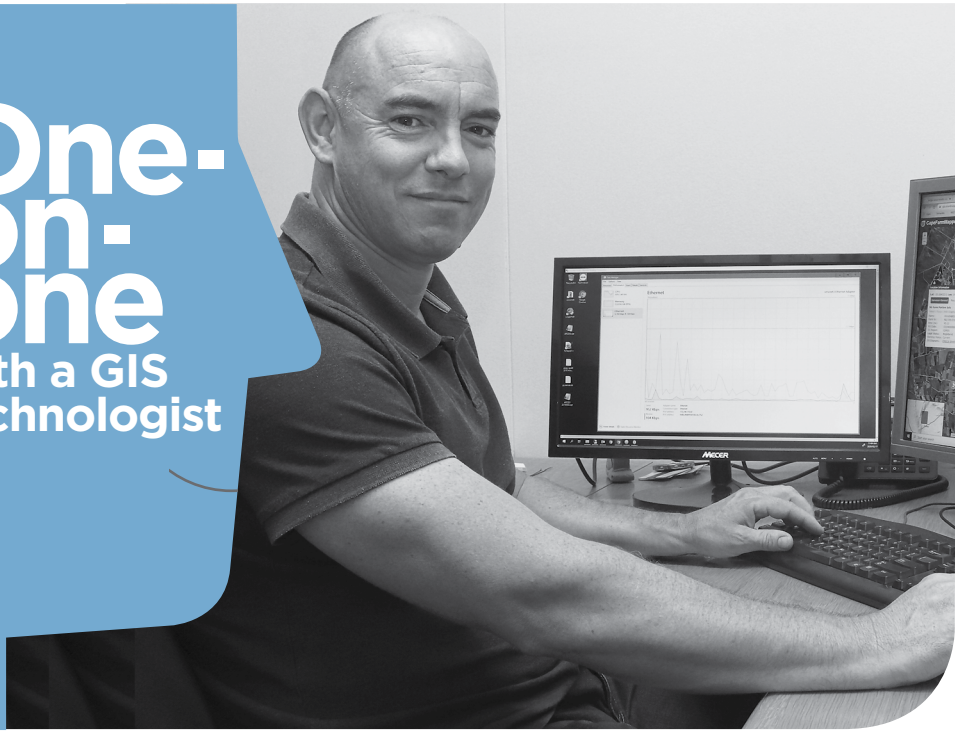
This is in most instances a three-year degree.

General entry level requirements to study GIS technology*:

B.Sc. Geoinformatics:

Mathematics:_____5____(60-69%)
Physical science:___5____(60-69%)
English/Afrikaans:__5____(60-69%)

One-on-one with a GIS technologist



> We work with such a wide variety of data – I'm never bored."

So says F.C. Basson, a GIS Technologist working for the Department of Agriculture in the Western Cape (at Elsenburg). "We do a range of jobs, from data capture, to analysing data, making maps and website programming."

F.C. obtained a B.Sc. with Geography and Applied Mathematics as his undergraduate degree from the University of Stellenbosch, and later obtained his Master's in GIS and Spatial Analysis, also from Stellenbosch University.

He says the career has changed a lot since he completed his degree – and today it's much more formalised. In order to prevent any person with GIS software from selling services that may not be up to standard, the South African Geomatic Council was created. All GIS professionals are now registered here.

While many of F.C.'s day-to-day tasks are computer-based, he and his team do have opportunities to head into the field. "We do go out, depending on the task, we could do field surveys working with GPS. Sometimes we join another specialist to assist them to capture or verify data."

The applications of GIS technology

GIS technology can assist the department or landowners in a variety of ways, from spatial analysis, to analysis of remote sensing data, and information on natural and agricultural resources. For example, with GIS technology, invasive alien vegetation can be mapped, which guides clearing activities. Or the technology could be used to map areas affected by drought – which in turn guides drought relief programmes.

The creative side of a GIS technologist

According to F.C., this career offers opportunities beyond the agricultural and environmental sectors, including the engineering and health sectors.

He believes GIS technologists should have an aptitude for mathematics and physical science. "The rest you can catch up on. Even geography is not that important, although it was always a passion for me."

F.C. also enjoys the creativity of the work. "The job entails making maps. This is very visual and allows us to be artistic. And on the programming side, you can let your imagination go – you're working in a creative environment. That's why I would say you need to have creativity and imagination for this work."

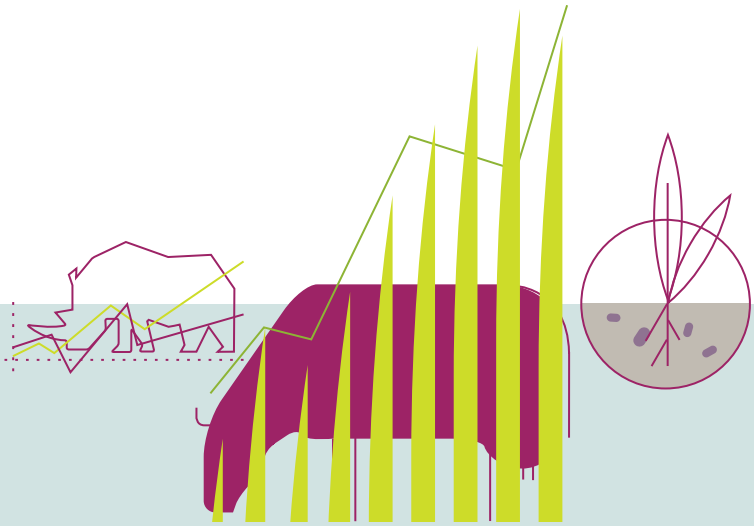
Grassland/ Pasture Science

SCARCE SKILL

What does a grassland/pasture scientist do?

The role of this scientist is to understand all the various aspects of rangeland and cultivated pastures: how it's used, how it should be conserved and how it can be improved.

They would help ensure sustainable animal production and use of rangeland or cultivated pastures and promote soil (and nature) conservation.



Where could you work?

Grassland/pasture scientists are employed in a broad range of sectors, including agriculture, mining, commercial banking, research or tertiary institutions. Opportunities also exist in conservation non-profit organisations, national parks (like South African National Parks), or other nature conservation agencies. Fertiliser and seed companies also employ these scientists.

Where can you study?

You could complete a B.Sc. Agriculture, majoring in Grassland Science. These institutions include modules or subjects specific to grassland/ pasture science. Some offer degrees and others diplomas:

- North-West University
- Unisa
- University of Fort Hare
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of the Western Cape
- University of Venda
- University of the Witwatersrand

What subjects and themes are you likely to study?

Subjects could include: pasture ecology, crop science, pasture management, genetics, pasture evaluation techniques, applied field management and plant physiology, microbiology and statistics.

What's the duration of the certificate/diploma/degree?

A B.Sc. in Agriculture is a four-year programme at most institutions.

General entry level requirements to study grassland science*:

B.Sc. Agric, majoring in Grassland Sciences:

Mathematics:_____5_____(60-69%)
Physical science:_____5_____(60-69%)
Language: _____4_____(50-59%)
Life sciences: _____5_____(60-69%)
Agricultural science:____5_____(60-60%)

Horticulturalist

What does a horticulturalist do?

Horticulturalists are involved in intensive plant cultivation for human use – both food and non-food crops.

The role could include the science around plant cultivation, as well as the business side (marketing or use of the product). These plants not only provide us sustenance and nutrition, but can also be used to beautify homes and parks and ultimately contribute to reducing our carbon footprint. Today sustainable use of these plants is key in this job.

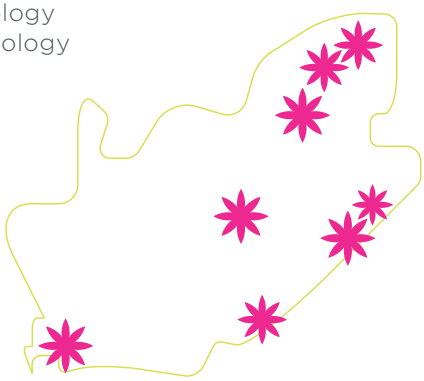
Where could you work?

From a garden, to a multinational corporation, the opportunities are diverse for horticulturalists. Government departments (national and provincial) require these skills, as do research and academic institutes. Both public and private nurseries could employ horticulturalists, as do farms involved in plant cultivation (such as blueberry or raspberry farms).

Where can you study?

One could enrol for a Diploma in Horticulture. Or one could obtain a B.Sc. Agriculture with Horticulture as a major.

- Cape Peninsula University of Technology
- Durban University of Technology
- Tshwane University of Technology
- Unisa
- University of Fort Hare
- University of KwaZulu-Natal
- University of Limpopo
- University of the Free State
- University of Venda



What subjects and themes are you likely to study?

There are a variety of undergraduate degrees and diplomas available to students wishing to follow this career. A B.Sc. in Agriculture with Horticulture as major could offer subjects such as plant propagation, applied plant science, ecophysiology of horticultural and agronomic crops and plant production systems.

What's the duration of the certificate/diploma/degree?

A diploma is a three-year programme at most institutions, while a B.Sc. degree is a four-year programme at most institutions.

General entry level requirements to study horticulture*:

Mathematics: _____5_____(60-69%)
Physical science: _____4_____(50-59%)
English/Afrikaans: ____4_____(50-59%)

Plant Breeding

SCARCE SKILL

What does a plant breeder do?

Plant breeders work to improve a plant, tree or crop's functioning – through manipulation.

You could do this by conventional breeding, by using biochemical and DNA markers, or through genetic engineering (or using DNA technology in general). Your work will likely take you into the field, into the greenhouse, and into the laboratory.

Where could you work?

In South Africa, you could be employed in the private sector by seed or food science companies, or other horticulture or forestry corporates. But there are also opportunities for plant breeders at research and academic institutions.

Where can you study?

You could study B.Sc. Agriculture, majoring in Plant Breeding. Institutions with options in plant breeding include:

- Unisa
- University of KwaZulu-Natal
- University of Limpopo
- University of Mpumalanga
- University of Stellenbosch
- University of the Free State
- University of Venda
- University of the Witwatersrand

What subjects and themes are you likely to study?

Subjects that are likely to be included in your curriculum are biochemistry, microbiology, genetics, botany and zoology, and you could combine your degree with agronomy, plant pathology or grassland science.

What's the duration of the certificate/diploma/degree?

This is a four-year degree, or you could look at a three-year B. Agric degree or a Diploma in Agriculture, which includes plant breeding modules.

General entry level requirements to study plant breeding*:

B.Sc. Agric majoring in Plant Breeding:

Mathematics:_____5____(60-69%)
Physical science:_____5____(60-69%) OR/AND
Life science: _____5____(60-69%) OR/AND
Agricultural science: _____5____(60-59%)
Language of instruction:___4____(50-59%)

Plant Pathology

SCARCE SKILL

What does a plant pathologist do?

Plant pathologists work to understand the impacts on the health of a plant. A plant pathologist would assess what causes diseases in plants, how it causes diseases and how this impacts on the growth, yield and quality of the plant. They would also seek solutions to control or manage plant diseases. Plant pathologists are generally more research-orientated.

Where could you work?

Given the strong research element, employment opportunities are likely at research agencies, tertiary institutions or within government departments (as a researcher). Companies such as agrochemical, seed, fertiliser, nurseries and pharmaceutical businesses require plant pathologist expertise. Careers include plant geneticist, plant breeder, aquatic botanist and more.

Where can you study?

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

What subjects and themes are you likely to study?

This depends on your institution of choice, but you could be exposed to plant pathology, botany, entomology, molecular biology, plant disease management and dynamics.

What's the duration of the certificate/diploma/degree?

For most tertiary institutions, this is a four-year degree.

General entry level requirements to study plant pathology*:

B.Sc. Agriculture majoring in Plant Pathology:

Mathematics:_____5_____(60-69%)
Physical science:____5_____(60-69%)
Life science:_____5_____(60-69%)
English/Afrikaans:___4_____(50-59%)
Other languages:____4_____(50-59%)

Precision Agriculture Technician

What does a precision agriculture technician do?

Precision agriculture is a way of farming that is more accurate and more controlled than traditional farming methods.

It makes use of new technology, such as GPS (Global Positioning Systems), drones and sensors to farm more 'precisely'. As a precision agricultural technician, you support this process, working with farmers to farm better (not necessarily harder). The career entails the use of technology – for example, using GPS to develop soil sample grids, or to create drainage patterns. Much of the work takes place in an office or laboratory.

Where could you work?

Precision agricultural technicians provide support specifically to farmers. Therefore, opportunities exist working for agricultural production companies that provide this service. Research and academic institutions employ these technicians. National and provincial agricultural departments also make use of these services. There are also options to specialise in the field, for example as a precision agronomist or crop manager.

Where can you study?

It's proposed that precision agricultural technicians obtain a Bachelor of Agriculture or a Bachelor of Science in Agriculture, majoring in Agronomy, Soil Science, Agricultural Economics or another agricultural arm of interest to you.

- Cape Peninsula University of Technology
- Mangosuthu University of Technology
- North-West University
- Unisa
- University of Fort Hare
- University of Limpopo
- University of Mpumalanga
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda

What subjects and themes are you likely to study?

This will depend on your degree, major and institution of choice. For a B.Sc. in Agriculture, you're likely to study options such as agronomy, soil sciences, agricultural economics, animal sciences, plant pathology and plant breeding.

What's the duration of the certificate/diploma/degree?

A B.Sc. in Agriculture is a four-year programme at most institutions.

General entry level requirements to study as a precision agricultural technician*:

Mathematics: _____5_____(60-69%)
Physical science: _5_____(60-69%)

Seed Production Technician

SCARCE SKILL

What does a seed production technician do?

A seed production technician produces high quality seed.

You are responsible to oversee the seed production area, including sorting and processing seed. At a senior level, you would also be responsible for planning and strategising on seed production. Managerial tasks could include staff management, negotiating contracts, and identifying potential production areas.

Where could you work?

You could work for a seed company or seed warehouse in the private sector. Opportunities also exist at research and academic institutions.

Where can you study?

It's recommended you obtain a Bachelor of Science degree, majoring in Horticulture, Plant Production or Plant Pathology. However, some colleges offer modules which relate to seed production. Institutions include:

- Cedara College of Agriculture
- Coastal KZN TVET College
- Durban University of Technology
- Elangeni TVET College
- Elsenburg Institute for Agricultural Training
- Madzivhandila College of Agriculture
- North-West University
- Owen Sitole Agricultural College
- Taletso TVET College
- Tompi Seleka College of Agriculture
- Tshwane University of Technology
- Umfolozi TVET College
- Unisa
- University of Fort Hare
- University of Limpopo
- University of Mpumalanga
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda
- Vuselela TVET College

What subjects and themes are you likely to study?

This depends on your institution, your qualification, and your major of choice. Should you opt to obtain a B.Sc. Agric, majoring in Horticulture, then themes could include crop production, horticulture and plant physiology.

What's the duration of the certificate/diploma/degree?

Depending on whether you opt for a certificate, diploma or degree, the programme ranges between three and four years.

General entry level requirements to study as a seed production technician*:

English/Afrikaans
(Home language or first additional language):_4____(50-59%)
Mathematics:_____5____(60-69%)
Physical science: _____4____(50-59%)

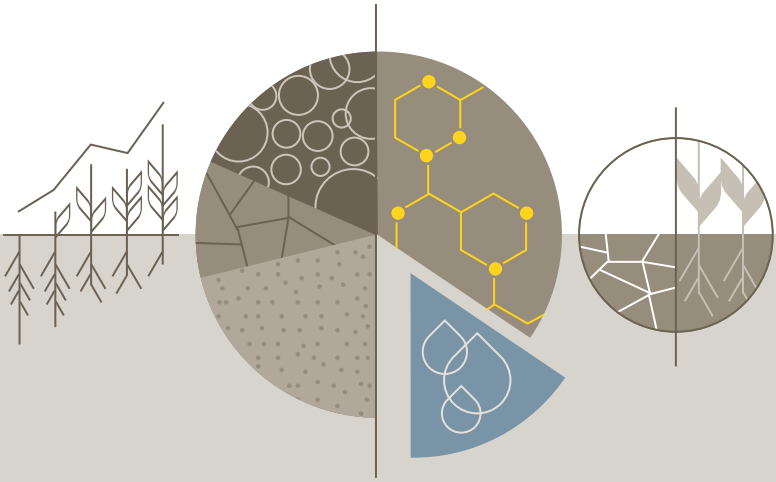
Soil Science

SCARCE SKILL

What does a soil scientist do?

Soil scientists look at both the physical and chemical properties of soil.

They could use this knowledge to increase crop productivity in a sustainable way (without leading to soil erosion or pollution), in order to feed a constantly growing population. A soil scientist will help to identify, map, and manage soils. They do this by analysing and interpreting soil data, monitoring soil productivity and supporting healthy soils.



Where could you work?

Soil scientists enjoy a wide array of career opportunities – including soil specialists (providing support to landowners), wetland specialists, watershed technicians and environmental technicians. Opportunities exist in the Department of Agriculture (both national and provincial), and a number of industries also require these specialised skills, such as fertiliser manufacturers, mining companies, consulting firms and non-profit organisations. Many research and tertiary institutions also employ soil scientists.

Where can you study?

- Coastal KZN TVET College
- Elangeni TVET College
- Fort Cox Agriculture and Forestry Training Institute
- Madzivhandila College of Agriculture
- North-West University
- Tompi Seleka College of Agriculture
- Umfolozi TVET College
- Unisa
- University of Fort Hare
- University of KwaZulu-Natal
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda
- Vuselela TVET College

What subjects and themes are you likely to study?

You could cover subjects and themes such as soil and water management, soil chemistry and fertility and soil biology.

What's the duration of the certificate/diploma/degree?

- B.Sc. (Agric) Soil Science: Four years
- National Diploma: Three years (some colleges offer soil science modules)
- National Certificate: Three years (Primary agriculture, with soil science modules)

General entry level requirements to study soil science*:

For a B.Sc. (Agric) majoring in Soil Science:

Mathematics:_____5____(60-69%)
Physical science:_____5____(60-69%)
Life science:_____5____(60-69%) OR
Agricultural science:_____5____(60-69%)
Language of instruction:__4____(50-59%)

One-on-one with a soil scientist

There are many directions and opportunities open to those who choose to become a soil scientist. Annemarie van der Merwe works at the Department of Agriculture (at Elsenburg) in the Western Cape as a soil scientist, her career of choice for the past 25 years.

Annemarie was drawn to the career for a number of reasons:

> "I was told that you must be strong in chemistry and agriculture, and you must like working outside to become a soil scientist. That's what I liked about it."

So she studied B.Sc. in Agriculture, majoring in Soil Science at the University of the Free State, and on graduation, chose to complete her Honours degree in Soil Science.

Her decision has allowed her to work in both the public sector (for the Department of Agriculture as a researcher), and the private sector, including a fertiliser company and a large vegetable farm.

The diverse opportunities

Her tasks over the years have been diverse, from field work, to working in a laboratory. For example, working for the fertiliser company, she would take soil samples, and make recommendations to farmers on which fertilisers to use. And at the vegetable farm in the Northern Cape, she planted different vegetable cultivars, to evaluate their performance and see which cultivar worked best.

An important element of soil science is soil classification. Annemarie obtained experience in this field working for Suidwes Cooperation in Leeudoringstad. "We would drill holes to classify the soil. When combined with the rainfall, you could assess which soil is best suited for which crop, such as maize or sunflower production or grassland."

Attention to detail: The traits of a soil scientist

In 2017, Annemarie returned to the Department of Agriculture at Elsenburg, where her focus has been on conservation agriculture. "It's rewarding because you're restoring the soil's fertility, so you use less fertiliser. You help the farmer to be more cost-effective and have a better water-use efficiency. It's exciting to see the crops grow and get the data from the different treatments of a trial."

Why soil scientists need to be precise

Annemarie believes those considering a career as a soil scientist need certain skills. "You have to be strong in science, and you should like biology. You also have to be analytical. You must be able to work on your own. But many of the trials are multi-disciplinary, and that makes it important to be able to work in a team too."

She adds, "You also have to be very precise. For example, if you incorrectly calculate your fertiliser on a small block and make a mistake, that mistake is multiplied. Attention to detail is crucial."

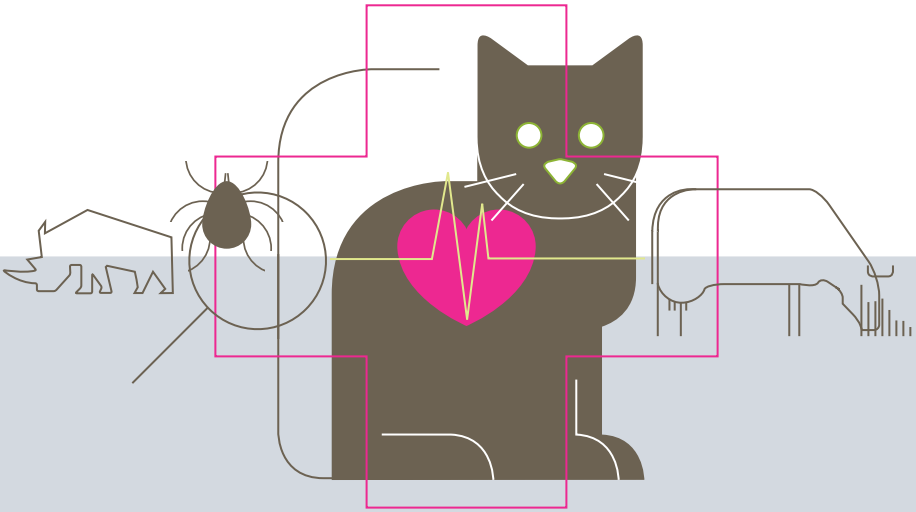
Veterinary Science

SCARCE SKILL

What does a vet do?

Veterinary science is also called veterinary medicine. Vets work with domestic animals (such as dogs and cats), farm animals (such as sheep and cattle) and with wild animals (such as buffaloes and rhino) to prevent, diagnose and treat diseases or illnesses.

They not only work with farmers, but with any pet owners, breeders and animal welfare groups (among others). By ensuring food-producing animals are healthy, vets help prevent potential animal diseases from being transmitted to people.



Where could you work?

Vets can work at private practices, providing support to farmers and pet owners. Qualified vets could also provide public health support, including maintaining hygienic conditions in abattoirs or milk processing plants. Vets could also be involved in research (from animal improvement to product development), and be employed by tertiary institutions. Or there are opportunities to become a state vet, playing a role in regulatory services (from monitoring and surveillance, to preventing and eradicating diseases).

Where can you study?

The University of Pretoria is the only tertiary institution responsible for training vets and veterinary nurses.

What subjects and themes are you likely to study?

Subjects include biometry (statistical analysis), genetics, molecular and cell biology, physics, mathematics, animal diversity, veterinary professional life, animal science, and more. You should have a strong interest in the medical field to complete this degree.

What's the duration of the degree?

The Bachelor of Veterinary Science (BVSc) is a six-year degree. The national Department of Agriculture then employs graduates for 12 months to complete a compulsory community service year. The Bachelor of Veterinary Nursing (BVetNurs) is a three-year degree.

General entry level requirements to study as a vet?

To study BVSc:

Mathematics:_____5____(60-69%)
Physical science:_____5____(60-69%)
English home language
(or English first additional language):__5____(60-69%)
Admission Point Score: _____35

To study BVetNurs:

Mathematics:_____4____(50-59%)
Physical science:_____4____(50-59%)
English home language
(or English first additional language):__4____(50-59%)
Admission Point Score:_____28

One-on-one with a veterinary scientist

> I don't think there's anything more rewarding than working with animals.

So says Dr Yashen Mungaroo, who is now living his dream, having graduated as a veterinarian from the University of Pretoria's Faculty of Veterinary Science at Onderstepoort in 2019.

"I grew up in a family where we were surrounded by animals and pets. They helped me see the value animals bring. I always wanted to do my part for animals." Yashen is currently doing just that at the Knysna Animal Welfare Society, where he is completing his community service year (a compulsory year following graduation).

He focuses on helping dogs, cats, birds and other small domestic animals. Down the line he also wishes to work with horses. His current workload includes a clinic session, assisting furry and feathered patients brought to the society by their owners. And about three hours every day are set aside for any operations and procedures required, such as removing lumps and neutering animals.

"I love my job, because every day is different. There's always variety, including different aspects of surgery and medicine," he says.

The importance of job shadowing

In order to study veterinary science, his school subjects included mathematics, physical science and English. While at school, he had to job shadow a vet during his free time, in order for his university application to be considered. (Recent entry requirement changes now mean that instead of being based solely on academic achievements, scholars are judged on the time spent job shadowing qualified state vets.) He also had to pass the National Benchmark Test before he was accepted.

Other than these requirements, Yashen recommends that prospective vets must have a lot of patience in dealing with many of the clients on a daily basis, and must be hardworking. He adds, "Compassion for animals definitely goes a long way, especially when building client relationships with the community.

"You must also have the stomach to handle the work – you must be able to handle your emotions. It's not just working with puppies. We unfortunately also see a lot of death but the benefits of helping those you can far outweigh the emotional toll."

The satisfaction of helping animals in need

What next for Yashen?

He enjoys many options following his community service year – given that veterinary science is a scarce skill in South Africa. He could enter a private practice as a vet, or get a postgraduate degree, specialising in a subject of his choice ("I would be interested in specialising in small animals, medicine or surgery," he says.) He could also work in a variety of fields in the profession – including large animals, exotic species, and even aquaculture.

For now, though, Yashen's considering a unique approach. He says, "I'm still deciding. But I'm considering travelling the country, working at various practices to gain essential experience."

Viticulture and Oenology

SCARCE SKILL

What does a viticulturist or oenologist do?

Oenology looks at the science of all aspects of wine and wine-making, from the harvest of the grapes, to fermentation, sampling, blending and bottling.

This career includes analysis and sensory evaluation of wine.

Viticulturists work specifically with the vines – using science to manipulate vines to produce the grapes required to make wine.

As a viticulturist, grape harvesting is an important part of the job function.

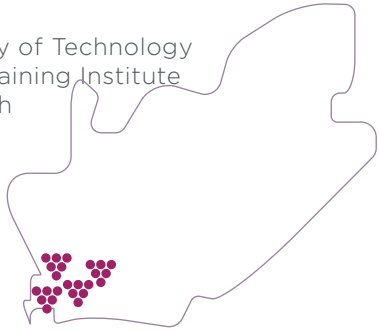
Where could you work?

From wine estates, wine cellars, to wine companies, you could undertake a vital role in the wine-making process. There are also a variety of available careers, such as winemaker or product developer. Qualified viticulturists could be employed at universities, or at research companies or organisations, or as technical food marketers.

Where can you study?

There are diplomas, degrees and postgraduate degrees available at these institutions:

- Boland College
- Cape Peninsula University of Technology
- Elsenburg Agricultural Training Institute
- University of Stellenbosch



What subjects and themes are you likely to study?

Subjects could include (depending on the chosen institution), viticulture and oenology, biology, crop production, physics, soil science, plant nutrition and wine grape cultivars.

What's the duration of the certificate/diploma/degree?

- **A B.Sc. Agriculture in Viticulture and Oenology** is a four-year degree.
- **A National Diploma** is three years.
- **The Elsenburg Agricultural Training Institute's B.Agric** (Cellar Technology) is three years.
- **Boland College offers a National Diploma** (two years' theory, one and a half year's practical).

General entry level requirements to study viticulture or 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%)

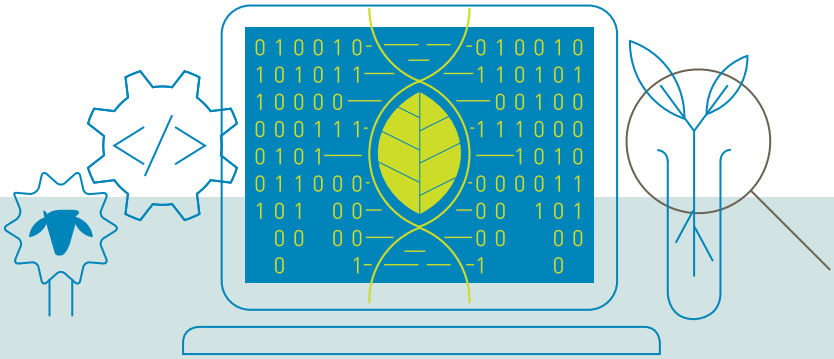
Bioinformatic Science

SCARCE SKILL

What does a bioinformatic scientist do?

As a bioinformatic scientist, you collect and analyse large amounts of datasets containing biological information.

(Think of genomic sequence data as an example). Simplified, in this role, you combine biology and information technology and computer science. It therefore could also include updating or amending software to suit specific projects, or even developing software specific to a project.

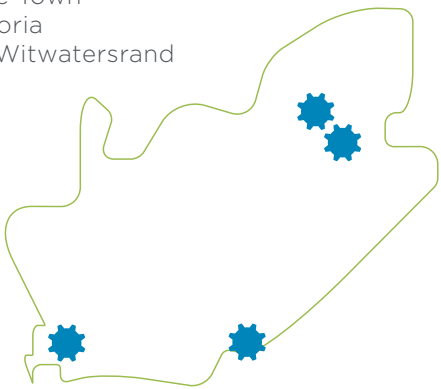


Where could you work?

Bioinformatic scientists could work in many different sectors such as genomics, drug discovery, clinical studies and agricultural science. This specialised skill is often required within research institutions or in the academic sector. It also opens up additional career opportunities, like stem cell technology, environmental biotechnology or even science journalism.

Where can you study?

- Rhodes University (postgraduate)
- University of Cape Town
- University of Pretoria
- University of the Witwatersrand



What subjects and themes are you likely to study?

Depending on your institution of choice, mathematics, computer science, chemistry and biology are likely to form the basis in your first year of study – with biochemistry and genetics added in the second year.

What's the duration of the certificate/diploma/degree?

This is a three-year degree, but further study is recommended.

General entry level requirements to study bioinformatic science*:

B.Sc. Bioinformatics and Computational Biology:

Mathematics: _____6____(70-79%)
Physical science: _____4____(50-59%)
English/Afrikaans
(Home language or additional first language): __4____(50-59%)

Climatology

What does a climatologist do?

As a climatologist, you study the climate, how it changes, and what causes those changes over time.

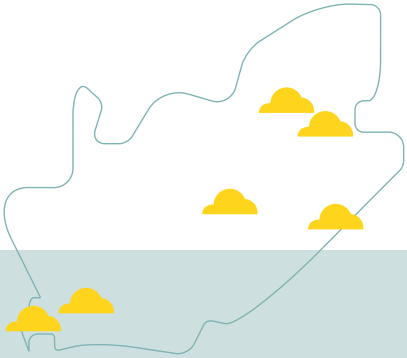
(This is not the same as forecasting the weather for tomorrow, a job undertaken by meteorologists.) Climatologists rather look at both natural and artificial elements that impact on our weather in the long-term (usually over 30-year cycles), like the geology, the atmosphere and water.

Where could you work?

While this is a fairly specialised career, there are still a broad range of opportunities, including government departments, research and tertiary institutions and non-profit organisations. In the private sector, you could work as a consultant, or you could be employed in sectors such as energy development or weather forecasting companies.

Where can you study?

- Unisa
- University of Cape Town
- University of KwaZulu-Natal
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of the Witwatersrand



What subjects and themes are you likely to study?

In order to become a climatologist, you are likely to require a B.Sc. that includes subjects such as climate studies or climatology, meteorology, geography, data analysis and more.

What's the duration of the certificate/diploma/degree?

A B.Sc. degree is a three-year programme, although it may be necessary to specialises in climatology (for example, an Honours degree in Atmospheric Science).

General entry level requirements to study as a climatologist*:

Mathematics:_____6____(70-79%)
Physical science:___5____(60-69%)
English/Afrikaans:__4____(50-59%)

Drone Operator

SCARCE SKILL

What does a drone operator do?

The use of drones is becoming increasingly popular, cost-effective and smart.

A drone operator steers the drone, which is used for a variety of functions. In agriculture, drones are used to survey and monitor livestock or crop growth (especially on large farms), and can help provide information to improve farming practices.

Drones can capture the impacts of management actions (for example, before and after images of invasive alien clearing activities), and are popular for their mapping functionality. Specialised drones can showcase the difference between healthy and unhealthy plants from a bird's eye view. Drones are ideal to monitor game – and can be used to support game management.

What's more, their application

is increasing daily.

Where could you work?

Drone operators could work within government, including conservation authorities (opportunities are increasing for these operators, particularly as a tool to monitor management actions – however, not necessarily as a full-time employment opportunity), or on game reserves (national parks or private game reserves). Many farmers make use of drones for the purposes listed above. Non-profit organisations may also employ drone operators for various functions (such as monitoring invasive alien clearing work). Many drone operators work either as entrepreneurs, or for consulting companies.

Where can you study?

If you fly a drone as a hobby, you do not need to have a license (although you do still need to follow the rules set out by the South African Civil Aviation Authority). If you plan to fly drones commercially, you will need a license (remember, if you buy your own drone to fly commercially, it must be registered by this authority). These institutions offer training (this list is growing and changing all the time):

- Cranfield Aviation Training
- Starlite Aviation Drone Academy
- Heli-X Charters
- ProWings
- RPAS Training Academy
- UAV Industries Flight School

What subjects and themes are you likely to study?

Subjects and themes you're likely to cover include navigation, meteorology, construction and flight, radio links and air law.

What's the duration of the course?

Courses are usually divided into theory and practical. The theory element is approximately one week, depending on your institution of choice. The practical element depends on your skill level. Once you have completed the course, you can apply for a Remote Pilot License (RPL).

General entry level requirements to become a drone operator*:

Class 3 aviation medical certification

English proficiency level 4 or higher certificate

Restricted Radio Telephony License

One-on-one with a drone operator

It's likely Arie van Ravenswaay has the most exciting job at the Western Cape Department of Agriculture. Arie develops, tests and then shares new innovations and technology with his fellow researchers, colleagues and landowners – with the goal of making farming easier and more productive.

> We look at new technology and innovation and find ways to apply it in agriculture and in government.

From web applications, to 3D printing, to flying quadcopters, Arie looks for ways to "help the agricultural sector move forward".

Drones in particular are offering smart new ways for farmers to manage their crops and their livestock. "We discovered that we can see things from the air; especially when we add a multispectral camera."

Using this new technology, drones are being used to monitor crops, to assess plant health ("you can see if plants are under stress, allowing farmers to act immediately"), track livestock and game and highlight dry areas which may need irrigation. Arie and his team use this technology for research purposes; and where appropriate, train farmers to do it themselves.

Arie's own 3D printer

While he has the expertise to fly drones, his university training was in actual fact in quite a different field. He obtained a Diploma in Packaging Technology and a Bachelor's degree in Graphic Design, both from the Central University of Technology.

Not one to shy away from a challenge, he teamed up with a friend to build their own 3D printer. They then used the technology to print a prosthetic limb for a person who had been born without a left hand. "I'm a techie," he says.

Be aware of strict regulations

While Arie enjoys testing new technologies, such as the drones, he warns that strict regulations ensure this is not a free-for-all. "The Remotely Piloted Aircraft Systems regulation is very strict. As a drone operator, you need a license to fly commercially. If you're delivering a service to a farmer, you must therefore have your license." It takes approximately a month to obtain a pilot's license.

Using technology to "help farming move forward"

And if a drone operator buys his or her own drone for commercial purposes, this must also be issued with a ROC (Remote Operator Certificate) from the South African Civil Aviation Authority – a process that can take up to two years if the drone is registered in the name of the company.

Arie says, "There may be some challenges at the moment for drone operators. But I see that these will be sorted in the near future. Drone operators are going to be in high demand in the future." What's more, there aren't only opportunities for operators. Drone technicians and drone data analysts could all benefit from this. "There are many career opportunities now accompanying this Artificial Intelligence technology."

He recommends that drone operators in the agricultural sector should have mathematics, physical science and biology subjects behind their name, as well as experience in GIS (Geographic Information Systems). "I have a love for technology and computers. So above all, you must be interested in this field and the sky is your limit, literally."

Environmental Science

What does an environmental scientist do?

Environmental scientists work in three main areas: understanding how the natural world works, understanding how humans and nature work together, and understanding how humans affect the environment (and to find ways to minimise our negative impacts on the natural world). That means that while you will be called a 'scientist', the role is much broader than that of science, incorporating the humanities (such as exploring politics or different cultures and how these are connected to the environment) and social sciences (for example, social relationships).

Where could you work

Many sectors – both public and private – require environmental scientist skills. Many government departments and municipalities employ environmental scientists. Non-profit organisations also make use of these skills, as do research and academic institutions. Becoming an environmental scientist also allows you to progress or move into a variety of linked careers. With further study, you could become an environmental lawyer, zoologist, environmental engineer, climatologist, meteorologist or writer.

Where can you study?

- Nelson Mandela University
- North-West University
- Rhodes University
- Tshwane University of Technology
- Unisa
- University of Cape Town
- University of KwaZulu-Natal
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda
- University of the Witwatersrand

What subjects and themes are you likely to study?

Should you opt for a B.Sc., majoring in Environmental Science, then subjects you're likely to study include biological resources, water resources, people and the environment, environmental economics and environmental law.

What's the duration of the certificate/diploma/degree?

This depends on whether you opt for a higher certificate, diploma or Bachelor's degree. A Bachelor's degree is between three and four years, depending on the institution, while a diploma is a three-year programme.

General entry level requirements to study environmental science*:

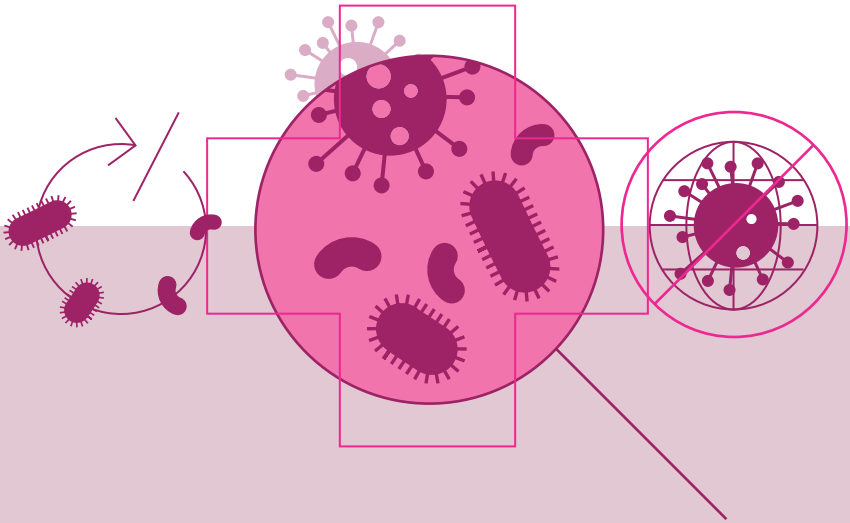
Mathematics:_____4____(50-59%)
Physical science:___4____(50-59%)
English/Afrikaans:__3____(40-49%)

Epidemiologist

SCARCE SKILL

What does an epidemiologist do?

Epidemiologists are often known by another name: disease detectives. When a disease breaks out, these professionals try to find out what caused the disease and how to prevent the spread of the disease and bring it under control. Sometimes veterinarians or scientists specialise in this field, using their background as a basis to find solutions. An important skill for an epidemiologist is communication, as they have to communicate their findings to health practitioners, policymakers and often the public.



Where could you work?

Epidemiologists could find employment at tertiary and research institutions as researchers, physicians or public health practitioners. Hospitals and clinics require these skills. And some non-profit organisations, private practices and industrial firms also employ epidemiologists.

Where can you study?

A Bachelor of Science in a related health field (such as Public Health) is recommended as an undergraduate degree. Graduates can then specialise in epidemiology at a postgraduate level.

- Field Epidemiology Training Programme (National Institute for Communicable Diseases)
- Unisa
- University of Cape Town
- University of Johannesburg
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of the Western Cape
- University of the Witwatersrand

What subjects and themes are you likely to study?

This depends on your degree of choice. For example, a Bachelor of Science in Public Health could provide course themes such as biostatics, epidemiology, the control of communicable and non-communicable diseases and health systems and policy.

What's the duration of the certificate/diploma/degree?

A Bachelor of Health Science is a three or four-year programme at most institutions.

General entry level requirements to study epidemiology*:

Mathematics:__5_____(60-69%)
Life science: __5_____(60-69%)
English:_____5_____(60-69%)

Food Scientist and Technologist

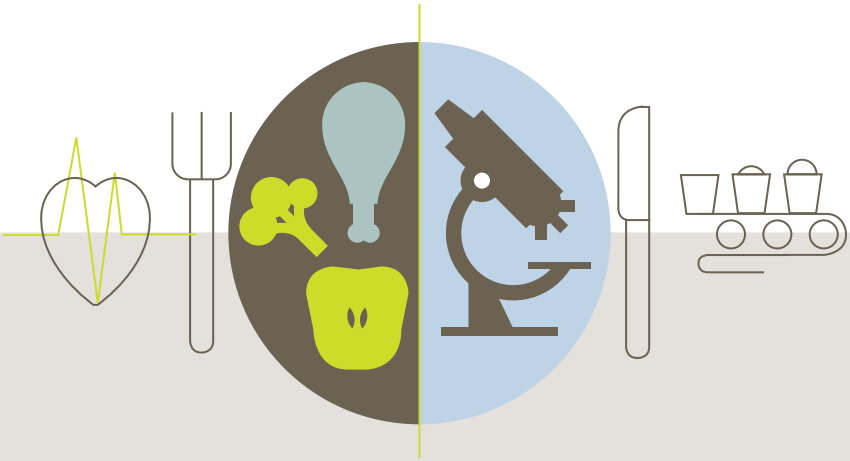
SCARCE SKILL

What does a food scientist and technologist do?

This is essentially the study of food: – from how it's made, to how it impacts on health and lifestyles.

You'll learn to use science and scientific principles to develop safe food for humans – with a focus on healthy, nutritious and affordable food. This field of study offers prospective students an opportunity to create new food products from traditional as well as new ingredients.

Food technology teaches you to produce and process foods at scale. You'll learn to package, distribute, preserve and safely use these foods.



Where could you work?

Food science careers include: managers in food companies (in divisions such as production, product development, quality control, research and development and more). You could work as a food technologist for industrial food manufacturers, beverage manufacturers, bottling plants, canning companies, dairies and fish and meat processors. In fact, the Food and Allied industries are major employers of food scientists and technologists. There are also opportunities as a self-employed individual or a consultant. Both careers are available in the public sector – working for government departments or parastatals.

Where can you study?

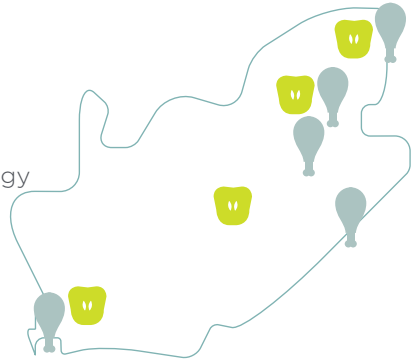
Bachelor of Science, Bachelor of Technology or Diplomas are available at these institutions:

Food science:

- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda

Food technology:

- Cape Peninsula University of Technology
- Durban University of Technology
- Tshwane University of Technology
- University of Johannesburg
- University of Venda



What subjects and themes are you likely to study?

Subjects could include chemistry, biochemistry, physics, mathematics, microbiology, food processing, preservation, packaging and product development.

What's the duration of the certificate/diploma/degree?

A Food Science degree is four years.
A Food Technology degree or diploma is three years.

Your entry level requirements to study food science and technology*:

Food science:
Mathematics:_____4____(50-59%)
Physical science:_____4____(50-59%)
Two languages:_____4____(50-59%)
Two other subjects:___4____(50-59%)

Food technology:
Mathematics:_____4____(50-59%)
Physical science:_____4____(50-59%) OR
Mathematics literacy:__4____(50-59%)

Market Analyst

What does a market analyst do?

Market analysts help their companies to make the right decisions in terms of their market.

These analysts make sense of market data (like sales data or customer information) to identify opportunities and risks in the market and provide insight into market strategies. Their goal is to support profit growth – like deciding which products to sell, and how best to sell them, while monitoring competitors and other market trends.

Where could you work?

Many private companies require market analysts to help guide market strategies. Agricultural market analysts often work for banks, or investment or commodities trading companies, to help guide investment decisions. Agricultural market analysts could also be employed by national or local government departments, or at academic institutions.

Where can you study?

There are numerous degrees you could study to become a market analyst. A popular path to follow is to obtain a Bachelor's degree in Market Research, Agricultural Economics or a related field.

- North-West University
- Unisa
- University of Fort Hare
- University of KwaZulu-Natal
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda

What subjects and themes are you likely to study?

Economics and agricultural economics are likely to feature in your degree. Other subjects could include statistics, business administration, social sciences, mathematics and computer science.

What's the duration of the certificate/diploma/degree?

A B.Sc. Agricultural Economics degree is four years, while other related Bachelor's degrees are usually three years.

General entry level requirements to study as a market analyst*:

Mathematics:_____4____(50-59%)
English/Afrikaans:__5____(60-69%)

Microbiologist

SCARCE SKILL

What does a microbiologist do?

Microscopic organisms, such as bacteria, viruses and fungi play a crucial role in many of earth's processes. Consider food spoilage or disease; these tiny organisms are present.

A microbiologist studies these organisms to understand their genetics, reproduction, their shape and structure and how they survive; as well as how they interact with each other.

The role of the microbiologist shouldn't be understated: the role could include ensuring food security, or protecting water resources.

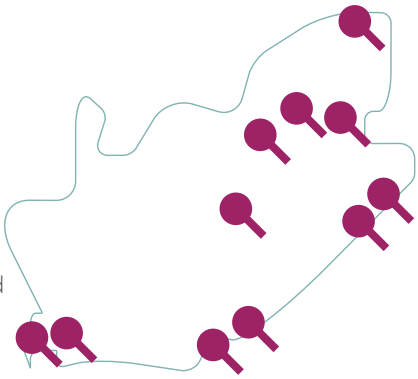
Where could you work?

Microbiologists can enter a range of different industries, such as the agricultural sector, the food industry, pharmaceutical companies and the health industry (for hospitals or clinical laboratories). Research or academic institutions also require these skills.

Where can you study?

It's recommended that you complete a B.Sc. degree, with Microbiology as a major.

- Nelson Mandela University
- North-West University
- Rhodes University
- Unisa
- University of Cape Town
- University of KwaZulu-Natal
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda
- University of the Witwatersrand
- University of Zululand



What subjects and themes are you likely to study?

Should you opt for a B.Sc. with Microbiology, then subjects could include microbial diversity, microbial molecular biology, microbial ecology and microbial physiology and metabolism.

What's the duration of the certificate/diploma/degree?

A B.Sc. with Microbiology as a major is a three-year programme at most institutions.

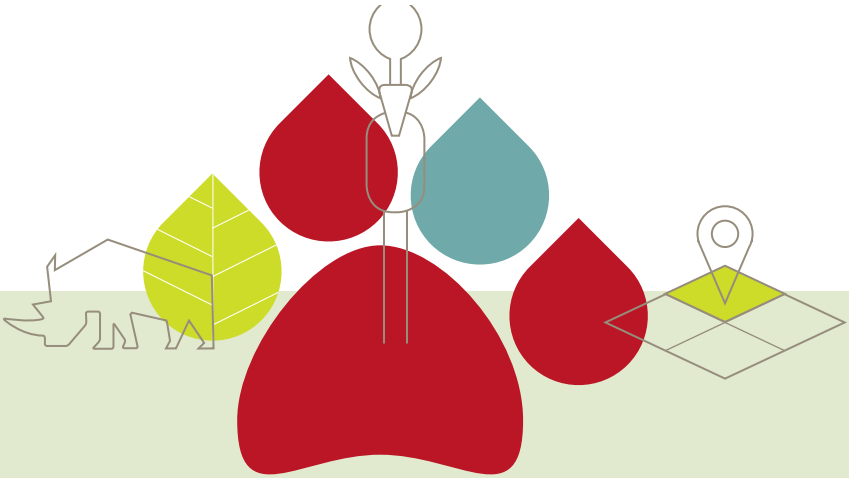
General entry level requirements to study microbiology*:

Mathematics: _____5____(60-69%)
Physical science: ___5____(60-69%)
Life science: _____5____(60-69%)
English/Afrikaans: __4____(50-59%)

Nature Conservation and Land Use

What does a nature conservationist do?

Nature conservationists protect the natural world – either in a national park, a game reserve, or within an organisation (such as WWF South Africa). They specifically focus on preserving biological life and/or ecosystems – many of these critically endangered.



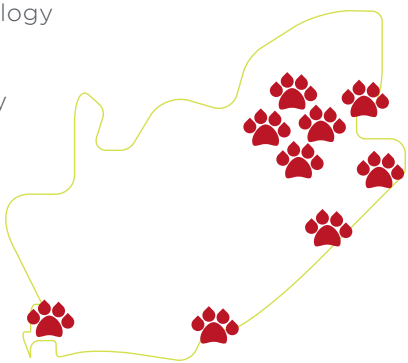
Where could you work?

You could be employed as a nature conservationist within government departments (national, provincial or local), or for national parks (like South African National Parks or CapeNature). Or you could be employed within the private sector, in private game reserves, conservancies or for non-profit organisations. Training as a nature conservationist could also create additional career opportunities, including research, eco-tourism, environmental education and more.

Where can you study?

These institutions offer diplomas, advanced diplomas, B.Tech. and Bachelor's degrees:

- Cape Peninsula University of Technology
- Mangosuthu University of Technology
- Nelson Mandela University
- North-West University
- Tshwane University of Technology
- Unisa
- University of Johannesburg
- University of Mpumalanga
- University of the Witwatersrand
- University of Zululand



What subjects and themes are you likely to study?

Your first year subjects could include conservation ecology, animal studies, plant studies, biodiversity management, principles of conservation and conservation communication.

What's the duration of the certificate/diploma/degree?

This is generally a three-year degree or diploma, depending on the academic institution.

General entry level requirements to study nature conservation*:

National diploma in Nature Conservation:
Mathematics:_____3____(40-49%)
English:_____4____(50-59%) OR
Mathematics literacy:__5____(60-9%)
Life science:_____4____(50-59%)
Agricultural science:___3____(40-49%)

Nursery Manager

What does a nursery manager do?

Nursery managers aren't just responsible for propagating and growing plants for sale.

Managers are also responsible for the running of the nursery in its entirety: such as the research and the display in the nursery, employing staff, budgeting and financial oversight. A forestry nursery manager does much the same, but in this case, you are focused mostly on growing trees that will be used in forests (either natural or man-made).

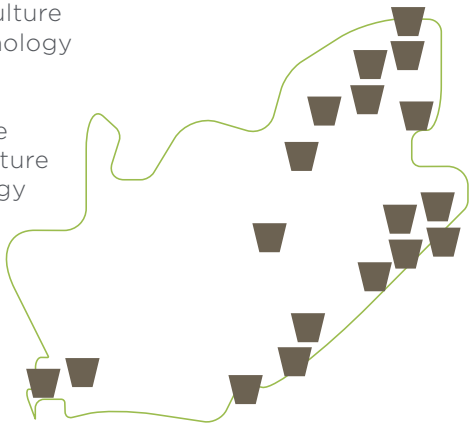
Where could you work?

You could work in different kinds of nurseries: succulent plants, fynbos or forests (or a nursery that sells a combination of plant and tree species). In most cases these are run by private companies, but there are a few state-owned nurseries in South Africa.

Where can you study?

Employers generally prefer candidates with a certificate, diploma or a Bachelor's degree. You could obtain a degree in Forestry, Agriculture, Botany or Horticulture as an example. Institutions include:

- Cape Peninsula University of Technology
- Durban University of Technology
- Fort Cox College of Agriculture and Forestry
- Madzivhandila College of Agriculture
- Mangosuthu University of Technology
- Nelson Mandela University
- North-West University
- Owen Sitole Agricultural College
- Tompi Seleka College of Agriculture
- Tshwane University of Technology
- Unisa
- University of Fort Hare
- University of KwaZulu-Natal
- University of Limpopo
- University of Mpumalanga
- University of Stellenbosch
- University of the Free State
- University of Venda
- University of Zululand



What subjects and themes are you likely to study?

Should you study a Bachelor of Science degree, you're likely to study subjects such as horticulture, agronomy, plant production, biology and botany.

What's the duration of the certificate/diploma/degree?

A Diploma in Horticulture is a three-year programme. A B.Tech. in Horticulture and a B.Sc. are usually four-year programmes.

General entry level requirements to study as a nursery manager*:

For a B.Sc. in Horticulture:

English/Afrikaans:___4_____(50-59%)
Mathematics: _____5_____(60-69%)
Physical science: ___4_____(50-59%)

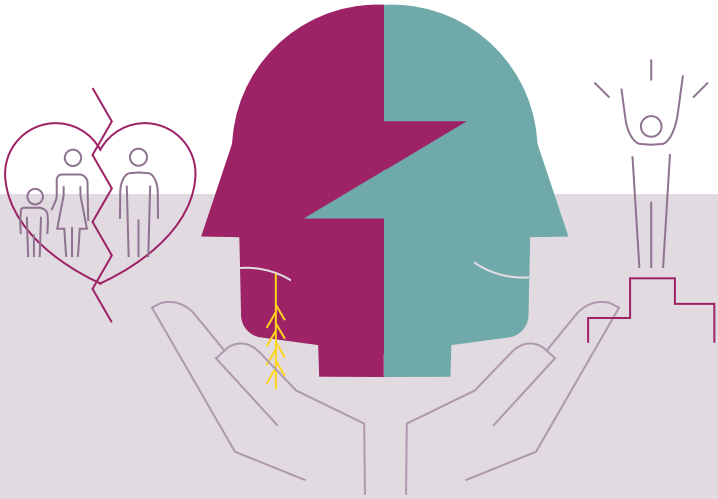
Social Worker

SCARCE SKILL

What does a social worker do?

A social worker helps to solve problems in human relationships.

In the agricultural sector (as in other sectors), there may be a need to support families affected by poor family relations, abuse, neglect or substance abuse. As a social worker, your role could be to empower people, and enhance well-being, to bring about social change, intervene early where problems are identified and to raise awareness of social risks and challenges.



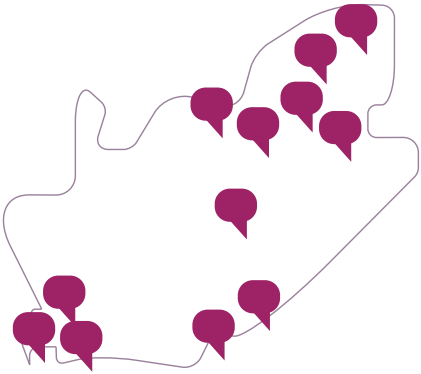
Where could you work?

There are a number of non-profit organisations that employ social workers to support families in the agricultural sector. Hospitals and clinics employ social workers, as do substance abuse clinics. National and provincial government may also require these skills (for example, in the Department of Social Development). The Western Cape Department of Agriculture also has a sub-programme dedicated to farm worker development, that employs social workers.

Where can you study?

Social workers in South Africa must register with the South African Council for Social Service Professions. Prior to that, the appropriate route to become a social worker could be to obtain a Bachelor of Social Work. There are, however, alternative options such as a Higher Certificate in Social Auxiliary Work.

- Nelson Mandela University
- North-West University
- Taletso TVET College
- Unisa
- University of Cape Town
- University of Fort Hare
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of the Western Cape
- University of Venda
- University of the Witwatersrand



What subjects and themes are you likely to study?

Should you enrol for a Bachelor of Social Work, you could major in subjects such as social work, psychology and sociology.

What's the duration of the certificate/diploma/degree?

A Bachelor of Social Work is a four-year programme at most institutions.

General entry level requirements to study as a social worker*:

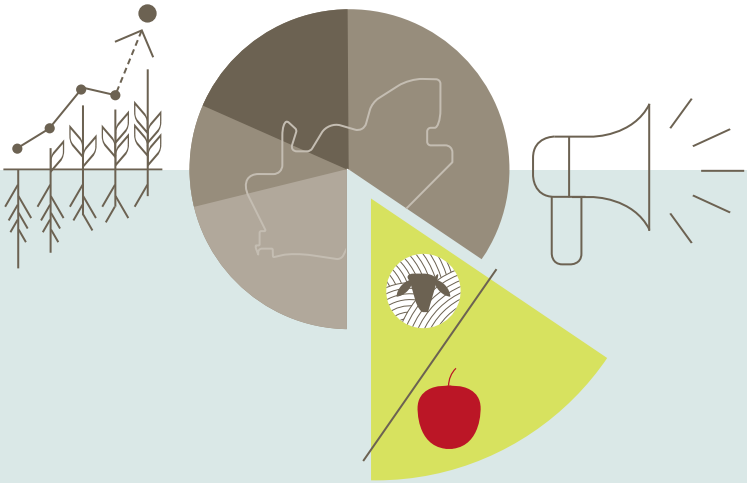
You need to pass a minimum of
four subjects at a rating of__4_____(50-59%).

Statistics

What does a statistician do?

The agricultural sector is a major contributor to the economy of South Africa. But someone has to collate the required information, to measure the sector's contribution.

That, among other things, is the role of the agricultural statistician. They collect information on the agricultural sector (on a variety of topics and themes, such as food use, or food security), verify the information and disseminate it. It also entails maintaining information and making certain projections.



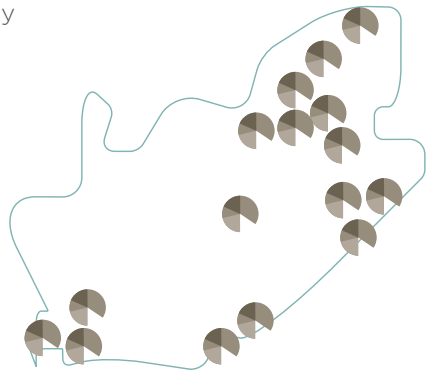
Where could you work?

Following this career path allows you to venture into many different jobs (not only that of statistician), such as a financial analyst or researcher. National and provincial agricultural departments employ statisticians, as do academic institutions. In the private sector, you could start a career at

a commercial bank, or other financial institutions.

Where could you study?

- Cape Peninsula University of Technology
- Durban University of Technology
- Nelson Mandela University
- North-West University
- Rhodes University
- Tshwane University of Technology
- Unisa
- University of Cape Town
- University of Johannesburg
- University of KwaZulu-Natal
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of Venda
- University of the Witwatersrand
- University of Zululand



What subjects and themes are you likely to study?

You're likely to study subjects such as mathematical statistics, applied sampling, operations research techniques and statistical aspects of data mining.

What's the duration of the certificate/diploma/degree?

In most instances, this is a three-year degree.

General entry level requirements to study statistics*:

Mathematics:_____5____(60-69%)
Physical science:___5____(60-69%)
English:_____4____(50-59%)
Life science:_____4____(50-59%)
Life orientation:___4____(50-59%)

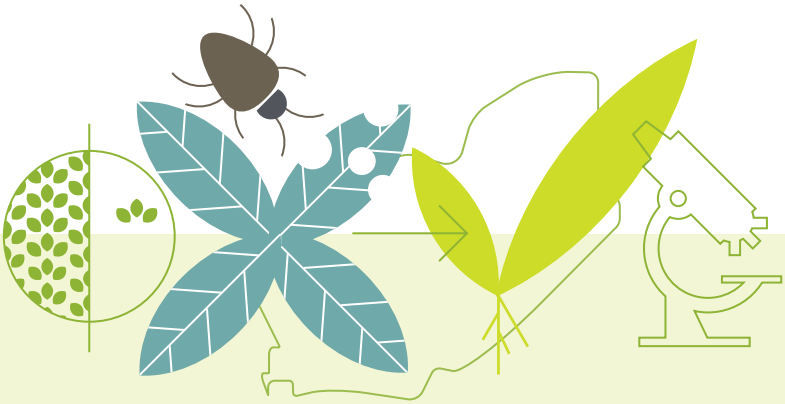
Weeds Biocontrol Science

SCARCE SKILL

What does a weeds biocontrol scientist do?

South Africa faces a major challenge from invasive alien plants. The weeds biocontrol scientist plays a vital part in reducing these invasive plants – to the benefit of indigenous habitat.

These scientists find natural enemies (from the country in which the plant originates) to the plants. They research the impact of the enemies (like insects or fungi) in a contained environment. And if it proves successful, they form part of the team that releases the biocontrol on the target species and monitors the impact over time.



Where could you work?

Research institutions such as the Agricultural Research Council (ARC) and the Council for Scientific and Industrial Research (CSIR) employ weeds biocontrol scientists. Government departments employ these specialists to support the biocontrol's release. And private companies are also playing a key role in developing new biocontrol agents. While you could be employed by a company, this sector also offers opportunities for private consultants and entrepreneurs.

Where can you study?
- Rhodes University
- Unisa
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of the Witwatersrand

What subjects and themes are you likely to study?
You could study a B.Sc. in Entomology. This degree could provide training in biodiversity and ecology, conservation ecology, microbiology, biometry and if you choose, genetics and soil science. You're likely to specialise in the latter years in entomology and agronomy.

What's the duration of the certificate/diploma/degree?
This is in most instances a four-year degree.

General entry level requirements to study weeds control science:
B.Sc. Entomology:
Mathematics:_____5____(60-69%)
Physical science:_____5____(60-69%) OR
Agricultural science:_____5____(60-69%)
English:_____5____(60-69%)

Zoology

SCARCE SKILL

What does a zoologist do?

If you love animals, then you may consider becoming a zoologist. A zoologist studies animals – and uses that knowledge to help manage and protect them.

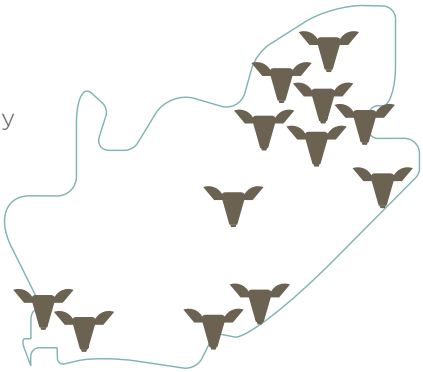
It's a broad field, and you could delve deeper into zoology, and study the origin of a species, its genetics, its life progression and behaviour. You could obtain a general knowledge of animal species, or specialise in one species – the choice is yours.

Where could you work?

Because zoology is a broad subject, there are numerous careers that use zoology as a foundation. You could use your skills as a conservator, extension officer, biotechnologist, science or environmental writer or forensic biologist. You could be a teacher, a researcher, a consultant or a zookeeper. Depending on your career of choice, you could work for a nature reserve (public or private), for government departments, for schools and universities, for research institutes or in the corporate sector.

Where can you study?

- Nelson Mandela University
- North-West University
- Rhodes University
- Tshwane University of Technology
- Unisa
- University of Johannesburg
- University of Limpopo
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of the Western Cape
- University of the Witwatersrand
- University of Zululand



What subjects and themes are you likely to study?

Depending on the institution of choice, this degree or diploma provides broad training in botany, zoology and ecology, research methodology and computer skills. Other subjects could include cell biology, angiosperm diversity, principles of evolution, invasion biology and more.

What's the duration of the certificate/diploma/degree?

This is a three-year degree at most institutions.

General entry level requirements to study zoology*:

B.Sc. Zoology:

Mathematics:_____5____(60-69%)
Physical science:_____5____(60-69%)
English home
(or English first additional language):__5____(60-69%)

Agroforestry

What does an agroforester do?

Agroforestry is the place where trees and agriculture meet (it's a career that combines economics, conservation, soil science and agricultural management). Agroforesters find ways for forests and agriculture (such as agricultural crops) to work together – to benefit both. You would therefore seek ways to improve the yields of the agricultural crop, but at the same time ensure the health of the forest. In South Africa, trees are often used as windbreaks to protect crops (this is one example of the planning an agroforester would be responsible for). In Africa, coffee crops grow better under the shade of trees (another example of the work undertaken by an agroforester).

Where could you work?

Agroforesters could be employed on farms, or in parks (private reserves or national parks), to help manage combined forest and agricultural areas. They could be employed by government to provide extension support to farmers. Agroforesters could also be employed in wood, sawmilling, silviculture of planted forests or ecotourism companies, or for conservation organisations or academic institutions.

Where can you study?

You could consider a degree. Some colleges offer a diploma with agroforestry modules.

- Fort Cox Agriculture and Forestry Training Institute
- Madzivhandila College of Agriculture
- Nelson Mandela University
- University of KwaZulu-Natal
- University of Stellenbosch
- University of Venda

What subjects and themes are you likely to study?

As part of your undergraduate degree, you're likely to study biology, chemistry, forest science, mathematics and physics.

What's the duration of the certificate/diploma/degree?

This is usually a three or four-year degree. Some colleges offer a diploma and advanced diploma with agroforestry modules, ranging from one to three-year programmes.

General entry level requirements to study agroforestry*:

English/Afrikaans
(Home or first additional language):___4_____(50-59%)
Mathematics:_____5_____(60-69%)
Physical science:_____4_____(50-59%)

Forest Biotechnology

SCARCE SKILL

What does a forest biotechnologist do?

Forest biotechnology entails the investigation of the biology of forest trees and to use the knowledge to, for example, increase the productivity of forest stands, or to expand opportunities in using trees for energy products.

A forest biotechnologist aims to understand the role played by specific trees, their biological characteristics, and what services they can provide. And it involves the use of genetics to answer these questions.

Where could you work?

This is largely a research-based career with opportunities in academia, research institutions or government departments. Companies in the pharmaceutical or food technology sectors could also require these specialised skills.

Where can you study?

In order to become a forest biotechnologist, you're likely to require a Bachelor of Science degree, with a focus on microbiology, biochemistry, chemistry, biophysics, and genetics, among other subjects. Some universities offer a B.Sc. Biotechnology as an undergraduate course.

- Cape Peninsula University of Technology
- Durban University of Technology
- Nelson Mandela University
- Tshwane University of Technology
- Unisa
- University of Cape Town
- University of Johannesburg
- University of Pretoria
- University of Stellenbosch
- University of the Free State
- University of the Western Cape
- University of the Witwatersrand

What subjects and themes are you likely to study?

Depending on the undergraduate degree you choose, you could study subjects such as biometry, plant biology, chemistry, genetics, microbiology, molecular and cell biology, mathematics and animal diversity.

What's the duration of the certificate/diploma/degree?

An undergraduate B.Sc. degree is a three-year programme.

General entry level requirements to study forest biotechnology*:

English/Afrikaans:___5_____(60 – 69%)
Mathematics:_____5_____(60 – 69%)
Physical science: ___5_____(60 – 69%)

Forester

What does a forester do?

A forester manages forests.

As a forester, you could be responsible for restoring a forest, protecting it (as part of a protected area), or for overseeing it for tourists, or for timber harvesting.

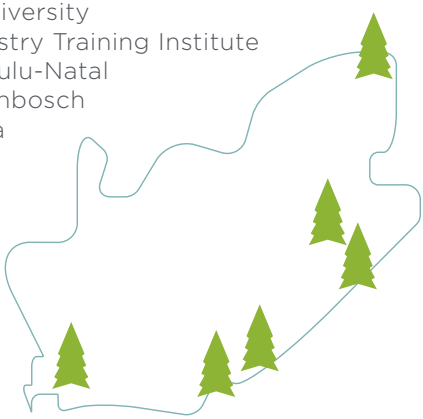
Where could you work?

Foresters enjoy a broad range of careers, including forestry management, forest engineering, nursery management, conservation management and fire protection. There are also opportunities within Global Information Systems (GIS) or transport management. The national Department of Environment, Forestry and Fisheries employs foresters, as do provincial forestry departments and universities. The private sector (such as timber companies) and consulting companies also make use of these services.

Where can you study?

It's suggested that professional foresters obtain a Bachelor's degree. Some colleges offer a diploma and advanced diploma.

- Fort Cox Agriculture and Forestry Training Institute
- Nelson Mandela University
- South African Forestry Training Institute
- University of KwaZulu-Natal
- University of Stellenbosch
- University of Venda



What subjects and themes are you likely to study?

Subjects could include biology, chemistry, forest science, mathematics, GIS, soil science, genetics and wood product science.

What's the duration of the certificate/diploma/degree?

This could be a three or four-year degree, depending on the institution of choice. Diplomas and advanced diplomas range between one and three years.

General entry level requirements to study forestry*:

B.Sc. Forestry:

Mathematics:_____6____(70-79%)
Physical science:___5____(60-69%)
English/Afrikaans:__4____(50-59%)

Forestry Economics

SCARCE SKILL

What does a forest economist do?

What contribution does a forest make to a country's economy? Forests provide value, not only through the harvesting of timber. They also offer value through their tourism potential, or their climate change mitigation, water quality protection, or conservation services.

Forest economists try to determine this value. This helps conservation authorities or companies use forests appropriately, and can help countries make appropriate policy decisions regarding their forests.

Where could you work?

Forest economists can be employed within the forestry branch of government departments (both national and provincial), and for some city councils. There are also opportunities in the private sector, for paper and packaging companies or timber-growing organisations.

Where can you study?

- Fort Cox Agriculture and Forestry Training Institute
- Nelson Mandela University
- South African Forestry Training Institute
- University of KwaZulu-Natal
- University of Mpumalanga
- University of Stellenbosch
- University of Venda

What subjects and themes will you study?

Depending on your institution of choice, certain B.Sc. qualifications or Bachelor's programmes in Forestry and Wood Science could offer the foundation for a career in forestry economics. Subjects could include biology, chemistry, forest science, mathematics and physics, as well as forest economics.

What's the duration of the certificate/diploma/degree?

This is usually a four-year degree. Some diplomas and advanced diplomas offer forest economics modules; these are three or four-year programmes.

General entry level requirements to study forest economics*:

B.Sc Forestry (major in Economics)

Mathematics:_____5____(60-69%)
Physical science:___4____(50-59%)
English/Afrikaans:__4____(50-59%)

Forestry Engineer

SCARCE SKILL

What does a forestry engineer do?

A forest engineer manages forest landscapes (not only the trees, but also the other natural resources you'll find here, like the soil and water) using engineering principles.

The forest engineer therefore works to restore and protect these forest landscapes, while ensuring sustainable economic activities (like timber harvesting or ecotourism activities). Your responsibility includes looking at the entire supply chain of the economic activities; for example, assessing the impact of tree harvesting, understanding the impact on potential forest sites and finding the best possible transport routes for the felled trees.

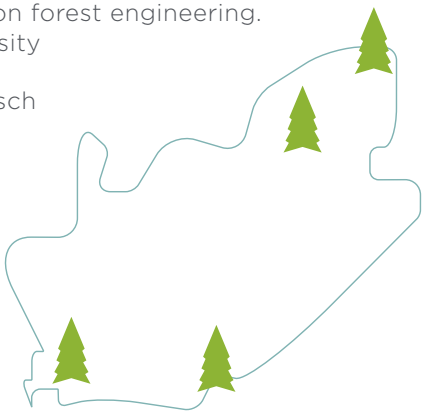
Where could you work?

Forest engineers can work for private manufacturing companies as land-use planners, foresters, land surveyors, conservationists, arborists or forest technicians. There are also opportunities in the research or education field.

Where can you study?

It's recommended that you obtain a Bachelor's degree to become a forest engineer. You could study a B.Sc. in Forestry. Some diplomas and national diplomas offer modules on forest engineering.

- Nelson Mandela University
- University of Pretoria
- University of Stellenbosch
- University of Venda



What subjects and themes are you likely to study?

If you opt to study a B.Sc. in Forestry, you could study subjects such as applied mathematics, forest science, engineering chemistry, engineering drawing, engineering mathematics, industrial programming and wood product science.

What's the duration of the certificate/diploma/degree?

A B.Sc. in Forestry is a four-year degree with most institutions. Diplomas and national diplomas range between three and four years.

General entry level requirements to study forestry engineering*:

Mathematics:_____5____(60-69%)
Physical science:____4____(50-59%)
English/Afrikaans:___4____(50-59%)

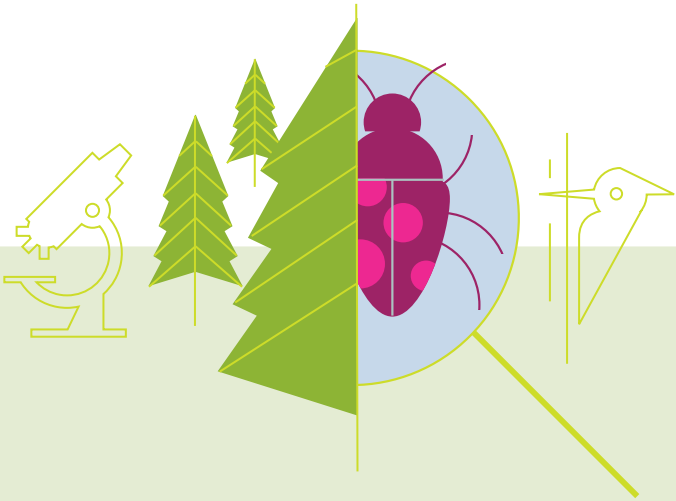
Forestry Technician

SCARCE SKILL

What does a forestry technician do?

Forestry technicians help to manage forest resources.

In other words, they research, protect and maintain a natural forest and its associated wildlife. Day-to-day jobs could include testing and analysing samples collected in natural forests, researching wildlife, insect treatment, working with researchers (for example in terms of disease control), assisting in fire prevention and providing forest education and extension.



Where could you work?

Forestry technicians could work for national or local government departments, and in particular, for conservation authorities in national or provincial parks with natural forests (like South African National Parks or CapeNature). Private companies (pulp and paper manufacturers) could employ forest technicians. Research and academic institutions could make use of forestry technicians, while non-profit organisations working to protect natural forest landscapes are likely to employ forest technicians.

Where can you study?
- Nelson Mandela University
- University of Pretoria
- University of Stellenbosch
- University of Venda

What subjects and themes are you likely to study?
Depending on your course of choice, and your academic institution of choice, you could study subjects such as forest protection, wildlife management, land surveying and forest science.

What's the duration of the certificate/diploma/degree?
Certificates and diplomas in forestry could provide a foundation to become a forestry technician. A Bachelor of Science degree in the field of natural resource science could support your career development. This is usually a three or four-year programme, depending on your institution of choice.

General entry level requirements to become a forestry technician*:
English/Afrikaans: __4____(50-59%)
Mathematics: _____5____(60-69%)
Physical science:___4____(50-59%)

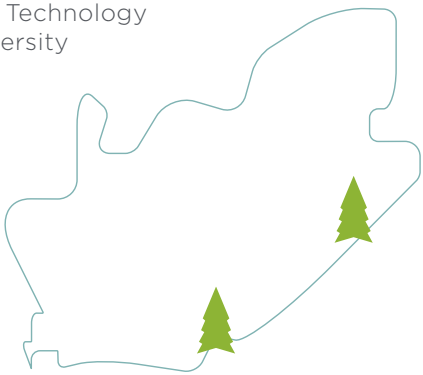
Pulp and Paper Technologist

SCARCE SKILL

What does a pulp and paper technologist do?
A pulp and paper technologist studies how to convert raw material (like wood) into pulp and paper products. That means you would need to understand how the process works, and to ensure it runs as cost-effectively (but safely) as possible, while still ensuring it's sustainable in terms of the environment. Pulp and paper technologists usually have chemical engineering expertise.

Where could you work?
Pulp and paper technologists can be employed at paper or packaging manufacturers, at academic institutions, or as consultants.

Where can you study?
- Durban University of Technology
- Nelson Mandela University
- Unisa



What subjects and themes are you likely to study?
Chemistry, mathematics and physics are traditionally required. More specialised subjects include pulp and paper making, engineering physics, applied thermodynamics and chemical engineering technology.

What's the duration of the certificate/diploma/degree?
Depending on your institution of choice, this could be a one-year national diploma.

General entry level requirements to become a pulp and paper technologist*:
Mathematics:_____4____(50-59%)
Physical science:___4____(50-59%)
English:_____3____(40-49%)

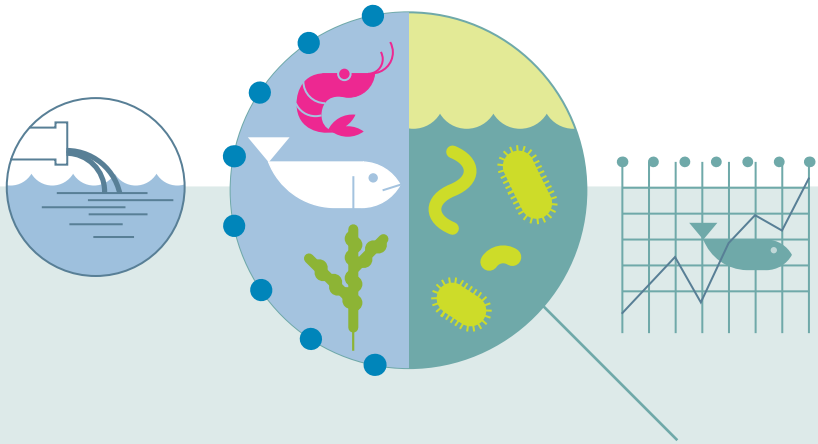
Aquaculture/ Aquatic Science

SCARCE SKILL

What does an aquaculturalist or aquatic scientist do?

Aquaculturalists farm with aquatic organisms – from fish to crustaceans, and even plants.
This takes place in a controlled environment. They 'feed' their stock (where appropriate), manage them, care for them, and ultimately sell them.

An aquatic scientist studies the 'health' of water environments – like a river, or an ocean. They assess the composition of the water, what nutrients are available in the water, bacteria or algae in the water, and potentially, water pollution, among other things.

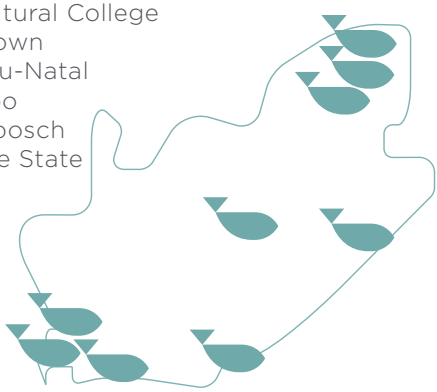


Where could you work?

You'll find opportunities for either of these careers within the public sector (national and provincial departments, as well as a city official). Aquatic research organisations will specifically employ scientists. Universities also make use of both of these professions. The private sector is another opportunity, working for aquatic product manufacturers or even for a consulting company.

Where can you study?

- Cape Peninsula University of Technology
- Madzivhandila College of Agriculture
- Nelson Mandela University
- Tompi Seleka Agricultural College
- University of Cape Town
- University of KwaZulu-Natal
- University of Limpopo
- University of Stellenbosch
- University of the Free State



What subjects and themes are you likely to study?

Depending on your institution of choice, or degree/diploma of choice, your first years could offer broader subjects and themes – such as ecology, botany, zoology – later specialising in aquatic and marine subjects.

What's the duration of the certificate/diploma/degree?

In most instances, this is a three-year degree. There are some colleges that offer modules in aquaculture. These are three-year diplomas.

General entry level requirements to study aquaculture or aquatic science*:

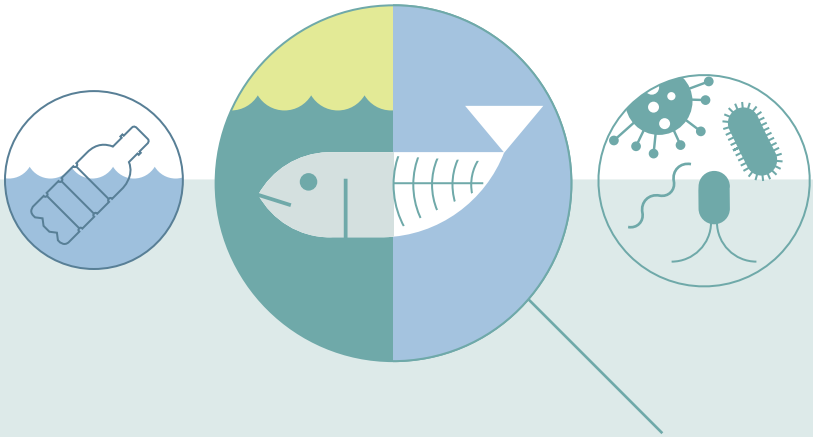
B.Sc. in Biological and Environmental Aquaculture/Aquatic Science

Mathematics:_____5____(60-69%)
Physical science:_____5____(60-69%)
English and additional language:__4____(50-59%)

Ichthyology/ Fisheries Science

SCARCE SKILL

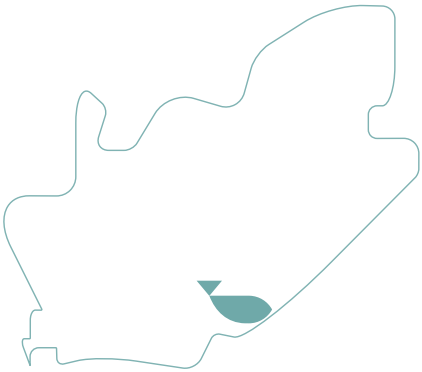
What does an ichthyologist or fisheries scientist do?
An ichthyologist/fisheries scientist is really a marine biologist who specifically studies certain fish species.
You'll look at their history, behaviour, reproduction, growth patterns and threats.



Where could you work?
Career opportunities include research (for research institutes, universities, government departments or non-profit organisations) or teaching and lecturing. Aquariums or museums may employ fish scientists. There are also opportunities within the corporate sector, like private fish farms or shellfish farms.

Where can you study?

- Rhodes University



What subjects and themes are you likely to study?

You're likely to study subjects such as cell biology, zoology, botany and chemistry as a foundation, before specialising in ichthyology in your second and third years.

What's the duration of the certificate/diploma/degree?

At Rhodes University, you'll study three years to obtain an undergraduate degree in Ichthyology.

General entry level requirements to study ichthyology or fisheries science?

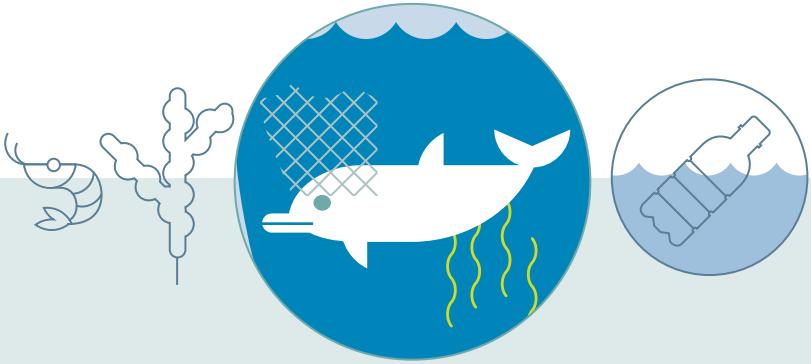
Mathematics: _____5_____(60-69%)
Life science: _____4_____(50-59%)
Physical science:__4_____(50-59%)

Marine Biology and Oceanography

SCARCE SKILL

What does a marine biologist do?

Marine biologists study the ocean – or the life that you'll find in the ocean. Often marine biologists study a specific marine species, like dolphins, whales or sharks, to better understand their behaviours, as well as the threats to those species. Today, marine biologists will also likely study the impact of humans on our oceans (and on the living organisms in our oceans).



Where could you work?

Should you study marine biology, it offers a broad range of career opportunities. You could work as a researcher for government departments, conservation authorities, research institutes (like the Council for Scientific and Industrial Research), universities or for non-profit organisations. You could become a teacher or lecturer, or use your skills as an environmental or science writer. There are also opportunities in aquariums or aquaculture

farms.

Where can you study?

- Cape Peninsula University of Technology
- Rhodes University
- University of Cape Town
- University of KwaZulu-Natal
- University of the Western Cape

What subjects and themes are you likely to study?

A Bachelor's degree, B.Tech. degree or diploma could include a range of subjects, such as ecology, computer skills and project management, as well as marine-related subjects such as marine science, marine biology, marine chemistry and marine physics.

What's the duration of the certificate/diploma/degree?

Depending on your institution of choice, this could be a three or four-year degree or diploma.

General entry level requirements to study marine biology*:

B.Sc. Marine Biology and Oceanography:

Mathematics:_____6____(70-79%)
Physical science:___5____(60-69%)

Marine Botany

SCARCE SKILL

What does a marine botanist do?

A marine botanist studies the plants (such as the algae, seagrasses and phytoplankton) you'll find in the ocean, in estuaries, and along the shoreline (in the intertidal zone).

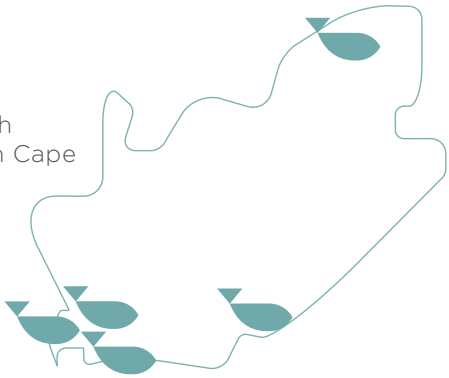
This is very much a research-based role, and your findings could be used to improve management of marine resources or to influence legislation.

Where could you work?

Marine botanists can be employed by research institutions, such as the Council for Scientific Research, or at academic institutions. Conservation authorities protecting Marine Protected Areas could make use of marine botanists, as could non-profit organisations protecting marine resources (such as the South African Association for Marine Biological Research).

Where can you study?

- Rhodes University
- Unisa
- University of Cape Town
- University of Limpopo
- University of Stellenbosch
- University of the Western Cape



What subjects and themes are you likely to study?

Depending on your institution of choice, you could study an undergraduate degree with subjects such as zoology, cell biology and marine biology.

What's the duration of the certificate/diploma/degree?

In order to become a marine botanist in South Africa, it's proposed you obtain a Bachelor of Science degree, either in Zoology (majoring in Ichthyology), or Marine Biology or Botany. This is usually a three-year programme. You could then go on to obtain an honours degree in Marine Botany.

General entry level requirements to become a marine botanist*:

Mathematics: _____5_____(60-60%)
Physical science: __5_____(60-69%)

How to get in touch with your institution of choice

Cape Peninsula University of Technology (CPUT)
PO Box 1906
Bellville
7535
Tel. 021 959 6767
Email: info@cput.ac.za
Website: www.cput.ac.za

Central University of Technology Free State
Private Bag X20539
Bloemfontein
9300
Tel. 051 507 3911
Website: www.cut.ac.za

Durban University of Technology
PO Box 1334
Durban
4000
Tel. 031 373 2000
Email: info@dut.ac.za
Website: www.dut.ac.za

Mangosuthu University of Technology (MUT)
511 Mangosuthu Highway
Umlazi
KwaZulu-Natal
4031
Tel. 031 907 7111
Email: info@mut.ac.za
Website: www.mut.ac.za

Nelson Mandela University
PO Box 77000
Port Elizabeth
6031
Tel. 041 504 1111
Email: info@mandela.ac.za
Website: www.mandela.ac.za

North-West University (NWU)
Private Bag X1290
Potchefstroom
2520
Tel. 0860 169698
Email: studies@mynwu.info
Website: www.nwu.ac.za

Rhodes University
PO Box 94
Makhanda (Grahamstown)
6140
Tel. 046 603 8111
Email: communications@ru.ac.za
Website: www.ru.ac.za

Tshwane University of Technology (TUT)
Staatsartillerie Road
Pretoria West
Pretoria
0183
Tel. 086 110 2421
Email: general@tut.ac.za
SMS number: 30655
Website: www.tut.ac.za

University of Cape Town
Private Bag X3
Rondebosch
7701
Tel. 021 650 9111
Email: graduation@uct.ac.za
Website: www.uct.ac.za

University of Fort Hare
1 King Williamstown Rd
Alice
5700
Tel. 040 602 2011
Website: www.ufh.ac.za

University of the Free State
PO Box 339
Bloemfontein
9300
Tel. 051 401 9111
Email: info@ufs.ac.za
Website: www.ufs.ac.za

University of Johannesburg
PO Box 524
Auckland Park
2006
Tel. 011 559 4555
Email: mylife@uj.ac.za
Website: www.uj.ac.za

University of KwaZulu-Natal
Mazisi Kunene Road
Glenwood
Durban
4041
Tel. 031 260 1111
Email: enquiries@ukzn.ac.za
Website: www.ukzn.ac.za

University of Limpopo
Private Bag X1106
Sovenga
0727
Tel. 015 268 9111
Email: enrolment@ul.ac.za
Website: www.ul.ac.za

University of Mpumalanga
Cnr R40 and D725
Mbombela
1200
Tel. 013 002 0001
Email: info@ump.ac.za
Website: www.ump.ac.za

University of Pretoria
Private Bag X20
Hatfield
0028
Tel. 012 420 3111
Email: ssc@up.ac.za
Website: www.up.ac.za

University of South Africa (Unisa)
Prelier Street
Muckleneuk Ridge
Pretoria
0003
Tel. 0800 00 1870/012 441 5888
Email: study-info@unisa.ac.za
Website: www.unisa.ac.za

University of Stellenbosch:
Private Bag X1
Matieland
7602
Tel. 021 808 9111
Email: info@sun.ac.za
Website: http://www.sun.ac.za

University of Venda
Private Bag X5050
Thohoyandou
Limpopo
0950
Tel. 015 962 8000
Email: info@univen.ac.za
Website: www.univen.ac.za

University of the Western Cape
(UWC)
Robert Sobukwe Road
Bellville
7535
Tel. 021 959 2911
Email: info@uwc.ac.za
Website: www.uwc.ac.za

How to get in touch with your institution of choice

University of the Witwatersrand
Johannesburg
1 Jan Smuts Avenue
Braamfontein
2000
Johannesburg
Tel. 011 717 1000
Website: www.wits.ac.za

University of Zululand
1 Main Road
Vulindlela
KwaDlangezwa
3886
Tel. 035 902 6000
Email: info@unizulu.ac.za
Website: www.unizulu.ac.za

Colleges:

Boland College
Private Bag X5068
Stellenbosch
7599
Tel. 021 886 7111
Website: www.bolandcollege.com

Coastal KZN TVET College
PO Box 1795
Amanzimtoti
4126
Tel. 031 905 7000
Email: info.coastal@kzntvet.edu.za
Website: www.coastalkzn.co.za

Elangeni TVET College
Private Bag X9032
Pinetown
3610
Tel. 031 716 6700
Email: info@elangeni.edu.za
Website: www.elangeni.edu.za

Esri South Africa College (GISc&t diploma)
Cnr New Road and 6th Road
Midrand
1685
Tel. 011 238 6300
Email: info@esri-southafrica.com
Website: www.esri-southafrica.com

Taletso TVET College
761-762 Setlogelo Drive
Montshiwa Unit 2
Mahikeng
2790
Tel. 018 384 2341
Email: info@taletsocollege.co.za
Website: https://taletso.edu.za/courses

Umfolozi TVET College
Naboomnek Street
Arboretum
Richards Bay
Tel. 035 902 9501
Email: info@umfolozi.edu.za
Website: www.umfolozicollege.co.za

Vuselela TVET College
8 Bram Fischer Street
Klerksdorp
2571
Tel. 018 406 7800
Website: www.vuselelacollege.co.za

Agricultural Colleges:

Cedara College of Agriculture
Private Bag X6008
Hilton
3245
Tel. 033 355 9304
Email: college@kzndard.gov.za
Website: www.kzndard.gov.za/colleges/cedara-college-of-agriculture

Elsenburg Agricultural Training Institute
Private Bag X1
Elsenburg
7607
Tel. 021 808 7700
Email: study@elsenburg.com
Website: http://www.elsenburg.com/services-and-programmes/elsenburg-agricultural-training-institute

Fort Cox Agriculture and Forestry Training Institute
PO Box 2187
King Williams Town
5600
Tel. 040 653 8033
Email: info@fortcox.ac.za
Website: https://www.fortcox.ac.za

Grootfontein Agricultural Development Institute
Private Bag X529
Middelburg
Eastern Cape
5900
Tel. 049 802 6600
Website: http://gadi.agric.za

Madzivhandila College of Agriculture
Private Bag X5024
Thohoyandou
0950
Tel. 015 962 7200
Website: www.madzicollege.gov.za

Owen Sitole College of Agriculture
Private Bag X20013
Empangeni
3880
Tel: 035 795 1345
Email: njabulo.ngcobo@kzndae.gov.za
Website: www.kzndard.gov.za/colleges/owen-sitole-college-of-agriculture

Potchefstroom College of Agriculture
Chris Hani Street
Potchefstroom Rural 2
Potchefstroom
2520
Tel. 018 285 0700
Email: potchcollege@nwpg.gov.za
Website: https://potchagricollege.co.za/

Tompi Seleka College of Agriculture
Private Bag X9619
Marble Hall
0450
Tel. 013 264 5376
Website: www.tompicollege.gov.za

Bursaries in agriculture

NAME OF THE BURSARY	WHERE CAN YOU STUDY
Agribusiness Centenary Bursaries	Accredited South African universities
AgriSETA Bursary	Accredited South African tertiary institutions
Citrus Academy	Accredited South African tertiary institutions
Council for Scientific and Industrial Research	Accredited South African tertiary institutions
Department of Agriculture, Land Reform and Rural Development Bursary Programme	Accredited South African universities
Fresh Produce Exporters Forum	Accredited South African tertiary institutions
Globeleq Scholarship Fund	Accredited South African tertiary institutions
HORTGRO Bursary Programme	Accredited South African tertiary institutions
Illovo Sugar Ltd Bursaries	Accredited South African tertiary institutions
Imfundo Trust (Old Mutual – via Study Trust)	Accredited South African universities
Industrial Development Corporation	Accredited South African tertiary institutions
Land Bank Bursary Scheme	Accredited South African universities
Lindsey Milne Bursary Scheme	Accredited South African tertiary institutions

Bursaries in agriculture

NAME OF THE BURSARY	WHERE CAN YOU STUDY
Maize Trust Bursary	Accredited South African tertiary institutions
MIG Sülter Bursary	Accredited South African universities
National Agricultural Marketing Council	Accredited South African tertiary institutions
Potato Industry Development Trust Bursaries	Accredited South African tertiary institutions
Sakata Seed Southern Africa	Accredited South African tertiary institutions
Santam Bursary (via Study Trust)	Accredited South African universities
Sappi Bursary Programme	Accredited South African tertiary institutions
South African Association for Food Science and Technology Foundation	Accredited South African tertiary institutions
South African Avocado Growers Association	Accredited South African tertiary institutions
South African Geomatics Council	Accredited South African tertiary institutions
South African Nursery Association Bursary	Accredited South African tertiary institutions
South African Society of Crop Production Bursary	Accredited South African universities
Sugar Industry Trust Fund for Education	Colleges (such as Owen Sitole and Cedara Colleges)
Sugar Industry Trust Fund for Education	Accredited South African tertiary institutions
The William Waddell Bursary Trust	Rhodes University

Notes

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