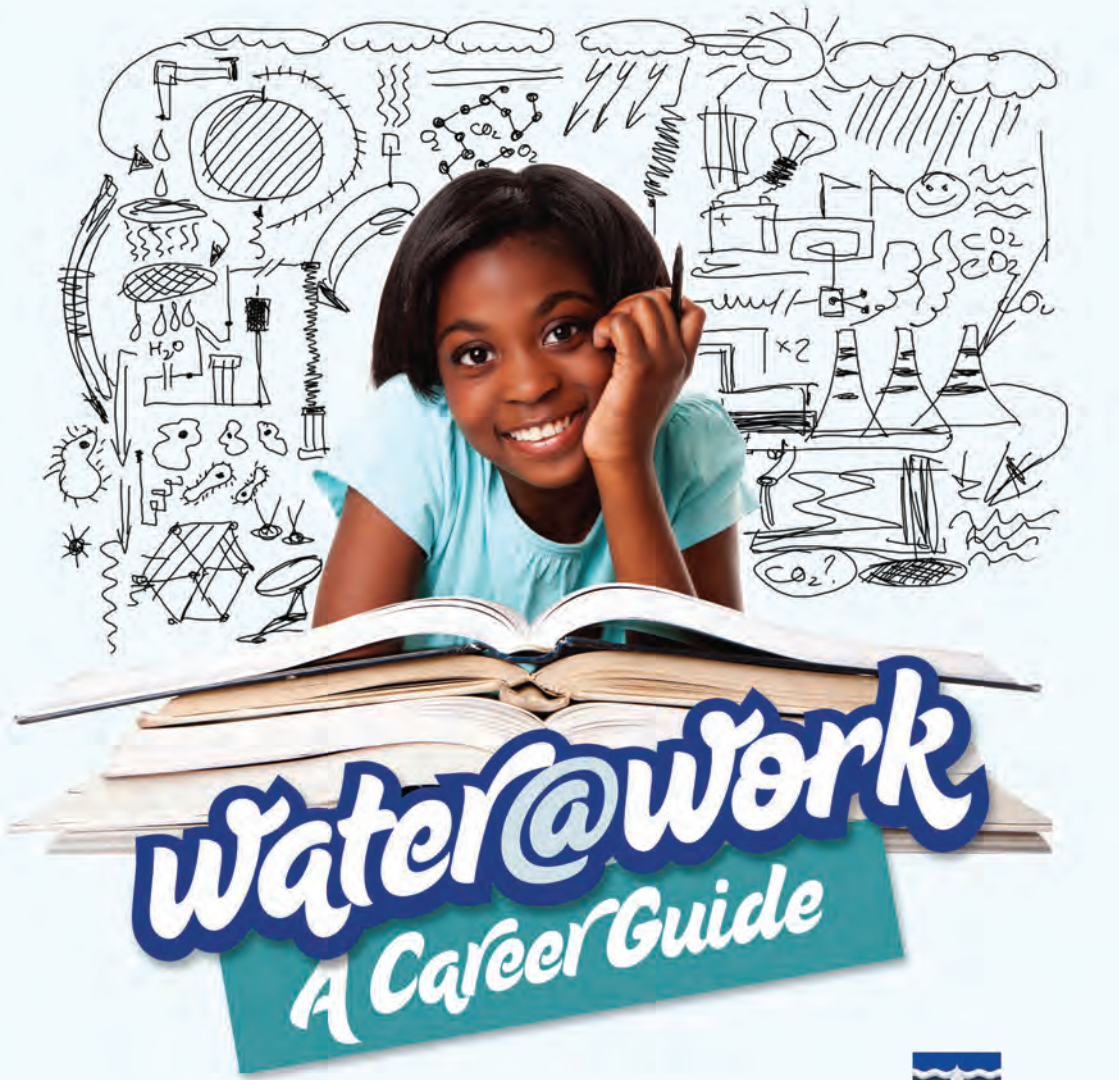

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A Career Guide

WATER RESEARCH COMMISSION


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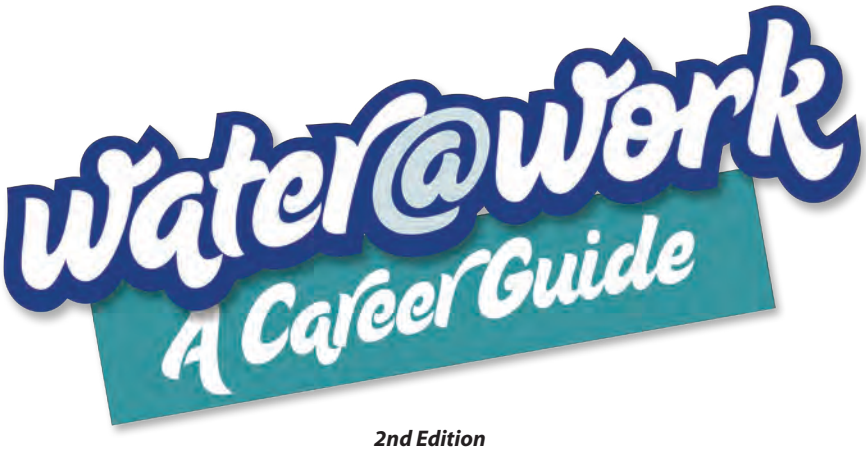

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DISCLAIMER

This career guide is intended as an overview of career paths available in the world of water and not as a comprehensive or up-to-date handbook. The details are published in good faith on the basis of material supplied and correct at the time of going to press. Readers are advised to check details before use, as they are liable to change without notice. The Water Research Commission cannot be held responsible for their accuracy, or for any use that may be made of them.

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List of abbreviations

APS:	Admission points score
CGS:	Council for Geoscience
CSIR:	Council for Scientific and Industrial Research
DEA:	Department of Environmental Affairs
DTI:	Department of Trade and Industry
DWA:	Department of Water Affairs
ECSA:	Engineering Council of South Africa
FET:	Future education and training
GIS:	Geographic information system
GPS:	Global positioning system
HSRC:	Human Sciences Research Council
NECSA:	Public relations and communications management
NGO:	Non-governmental organisation
NRF:	National Research Foundation
SANDF:	South Africa National Defence Force
SPE:	Society for Professional Engineers
SABS:	South African Bureau of Standards
SANP:	South African National Parks
SETA:	Sector Education and Training Authority

Message from Dhesigen Naidoo

CEO of the Water Research Commission

One will have to search long and hard to find a sector that offers as much opportunity and diversity as the South African water sector.

Despite its small size, the South African water industry is recognised globally for its innovation and creativity in science and technology. The water research community, in particular, is highly productive, ranking among the top 20 in the world. South Africa is also among only a handful of countries that have a dedicated national water research and development agency in the form of the Water Research Commission.

Living in a country that receives less than half the world's average yearly rainfall, and where only 9% of that rain ends up in our river systems, has meant that the sector has had to find resourceful ways to ensure that every citizen in the country has access to clean water, that our water-powered industries can be sustained, while protecting our aquatic environment.

The South African water sector faces many challenges, such as the growth of the population, the need to grow the economy, the pollution of our scarce water resources, and the threat of global climate change. These are all opportunities for a new generation of water sector specialists to be innovative in creating the necessary solutions to ensure our country remains on a sustainable path going into the future.

The WRC has long realised the importance of growing a strong, well-skilled water sector to tackle the country's water challenges.

Every year the Commission supports hundreds of postgraduate students through its research. Many of these students have gone on to lead their own research projects and become heads of water research institutions.

This second edition of the Water Research Commission's extremely popular Career Guide offers information on no less than 62 different career options in the water sector, excluding the various sub-disciplines. So whether your passion is microbiology, zoology, engineering, law or working with people, the water sector offers you the promise of a fulfilling career. Various useful contacts, including those institutions that offer bursaries and internships, have also been included.

May studying these pages be the first step in your journey to becoming a member of the South African water family.

Section 1: Preparing for a career in water

OVERVIEW

INTRODUCTION

Choosing a career is one of the most important decisions you will ever make. Your career is not merely a way to earn a living, it is also a way to reach your full potential, being committed to your career choice, and developing the skills you will need to advance.

This book provides information on the types of employment available in the water and other sectors as well as the qualifications you will need for your chosen career path and information on where you can gain additional insight. We have also provided you with a list of possible bursary opportunities.

Working in the world of water

Water in Africa is precious. At every single stage of the water cycle, trained people are needed to look after it, to store it, to make sure it is clean enough for use, or to help people and industries gain access to it. This means that the world of water offers a large variety of different job opportunities.

South Africa is critically short of skilled staff at all levels in the world of water. Wherever people need water there are career opportunities in work that is worthwhile and interesting.

The jobs are at all educational levels and in every type of environment across the county – in cities, in nature reserves, on farms, or in isolated villages.

Water is used in every part of our lives and the economy depends on reliable sources good quality water. Therefore, work opportunities cover the whole spectrum of employment from government, research institutions, water utilities, to industry, consultancies, non-governmental organizations, and private enterprise.

The Department of Labour has issued a list of scarce and critical skills (see Section 3). This list has been adapted specifically for the world of water and should be referred to when consulting the A-Z careers in the world of water.

This book is a guide to the many options available to anyone looking for a career path in the fascinating world of water. It describes the wide variety career options available. It gives an overview of work opportunities in the world of water. It provides information on where you can study further and where you can find out more. Each career description gives details about the kind of work, tasks, and responsibilities involved; the working environment you can expect; subjects to study; and training and qualifications to pursue.

PREPARING FOR A CAREER

It is important to take every precaution to choose your career wisely. Career assessment while you are still at school can be useful as it takes into consideration your interests, personality, abilities, school record and motivations. Aptitude tests can be arranged at school or by most higher education institutions. These can help you plan your curriculum and career

While you are still at school and deciding on your future, you will need to think carefully about your career direction and what subjects and marks you will need for that career. You should also consider the following:

- What kind of work will suit your personality best – are you outgoing and sociable, or do you prefer to work alone?
- Are you practical and technical, or are you an academic?
- What are your interests?
- Where are you most comfortable – in an office or outdoors?
- Are you good at negotiating and do you tolerate different viewpoints?
- Are you good at researching, cataloguing, interpreting, classifying, selecting, organising?
- Can you work with different computer programs?
- Are you good at expressing yourself, listening, writing, interpreting, criticising constructively, debating, negotiating, explaining?
- Do you enjoy working with numbers – measuring, estimating, calculating?
- How good are you at thinking things out, planning, assessing, analysing, strategizing, evaluating?
- Do you prefer to focus on implementing ideas or projects? Do you feel the need to start up new projects, or on seeing a particular job or activity through to its conclusion?

In looking towards your future you should consider what you would like to achieve through your work, such as job satisfaction, money, responsibility, status, secure employment, your own business. Do you need security, challenges, recognition? Do you need to feel you are making a difference? Do you need to be in charge?

Employers and surroundings

Do as much research as possible on the careers you are considering and the types of organisations in the fields that interest you. Are these the types of organisations you would like to work in? Check the opportunities for advancement in your chosen field.

The wide range of employers in the world of water includes the following:

- private sector employers such as business, commerce, and industry; engineering firms that design and construct many of the facilities needed to store, supply, and treat water; manufacturing firms that plan, produce, and market equipment and devices for water-supply control and management; consulting engineers that survey and rehabilitate sites where water has been polluted

- public sector employers for example government departments, utilities such as Umgeni Water or Rand Water
- community employers, and non-governmental organisations (NGOs)
- self-employment as an entrepreneur, or as a professional consultant or contractor
- institutional employers specialising in research and high-level teaching including universities, science councils, and research institutes that employ lecturers or professional researchers in specialist programmes or projects
- international agencies such as the United Nations employs people in many programmes that focus on local water quality and resources; UNESCO employs people to promote safe drinking water in developing countries; the World Bank, the Asian Development Bank, and similar organisations evaluate and finance irrigation and water-supply projects around the world.

Water-related careers mean that you can choose to specialise in work that you do indoors in an office, factory or laboratory, or outdoors in natural environments gathering data or water samples or conducting geological surveys, or in rural or small town or urban surroundings.

HOW TO QUALIFY

School subjects

It is best to choose your National Senior Certificate subjects as early as possible as your choice of subjects will affect your study path and career. If you need a university exemption, you have to take six subjects from four different subject groups. Each university has a different requirement for its admission points score (APS).

To pass the NSC with entry to higher certificate study

A learner must:

- Pass the NSC
- Meet the language requirement for further study at a South African institution.

Language requirement for entry to further study

- One of the two official languages offered by the learner must be either English or Afrikaans. To meet the language criterion to qualify for entry to study at a tertiary education institution, the learner must pass either English or Afrikaans at the First Additional level, i.e. at 30% or more
- A learner who offers 2 official languages at Home Language level, one of which is English or Afrikaans, and the other one of the other official languages, e.g. Zulu, and obtains between 30% and 39% in English or Afrikaans (i.e. does not pass it but obtains 30% or above) and passes the other language, qualifies for entry to further study at a tertiary institution.

To pass the NSC with entry to diploma study

A learner must:

- Pass one official language at Home Language level at 40%
- Pass 3 other subjects at 40% (excluding Life Orientation)
- Pass 2 subjects at 30%

- Meet the language requirement for further study at a South African institution.

The key difference between qualifying for entry to diploma study rather than higher certificate study is that a learner must achieve 40% or more in 4 subjects (including the official language at Home Language level, but excluding Life Orientation) rather than just 3 subjects.

To pass the NSC with entry to degree studies

A learner must:

- Pass one official language at Home Language level at 40% or more
- Pass 4 subjects from the designated list at 50% or more
- Pass 2 subjects at a minimum of 30%
- Meet the language requirement for entry to further study.

The list of designated subjects is as follows: Accounting; Agricultural Sciences; Business Studies; Consumer Studies; Dramatic Arts; Economics; Engineering Graphics and Design; Geography; History; Information Technology; Languages (one language of learning and teaching at a higher education institution and two other recognised language subjects); Life Sciences; Mathematical Literacy, Mathematics; Music; Physical Sciences; Religion Studies; Visual Arts.

Non-designated subjects may contribute towards the APS and may be recognised as an institution or faculty specific entry requirement. Learners must check their results against specific institutional requirements. If you have not met the minimum statutory requirements or are short of one requirement for degree studies, you should contact the admissions office at the institution you are interested in studying at. They will advise you of possible options.

Career fields for water-related work

Below are some examples of career fields, typical grade 12 subjects, and associated water-related careers.

Qualifications at all levels are available in the different South African tertiary education institutions. Find out what institutions offer by way of vocational or structured courses, or what options they offer in more general courses. Some institutions cluster subject areas to provide for particular employment. Check with each school or faculty that seems to offer what you want, and ask for assistance from the student counselling or career counselling division of the institution.

The career fields described below do not always have a central focus on water, but all of them contain possibilities for work in water-related activities.

Humanities and social sciences

Careers: political scientists, geographers, sociologists, anthropologists, translators, lawyers, and historians are involved in the growing public interest in water and the quality of our environment. As water resources become increasingly scarce, we need more effective administrative and

political institutions for water planning, development and management. To plan for the efficient use of water in municipalities, agriculture, mining, and industry, we need to know about water resources, population growth, and industrial and urban development. Policies, guidelines, and laws about water use have to be developed.

Commerce

Careers: administrators and managers trained in water-resources administration are in demand. So are accountants, bookkeepers, secretaries, and economists.

Sciences

Careers: hydrologists, computer programmers, laboratory technicians, climatologists, microbiologists, biotechnologists, chemists, geologists, engineering technicians, statisticians, limnologists, mathematicians, hydrogeologists, geomorphologists, botanists, and ecologists all play essential roles in water-related activities and industries.

Engineering

Careers: many types of engineers address water-resource issues: agricultural, civil, environmental, and hydraulic engineers survey water resources, measure water flows above and below ground, gather and analyse data about floods, and construct facilities to store, treat, transport, and distribute water.

Technical/practical

Careers: fitters and turners, boilermakers, plumbers, draughtsmen, engineering technicians, surveyors, and laboratory assistants provide services that are crucial for delivery in the world of water.

Medical

Careers: nurses, doctors, community health workers, specialists in water-borne diseases, and other health professionals are involved in work associated with the provision of water that is safe for humans to use.

Apprenticeships

An apprenticeship provides technical training with practical and theoretical modules. Apprenticeships are offered for specific trades and, after passing a trade test, you will be awarded the National Trade Certificate. Apprenticeships differ from learnerships in that they are job and not career orientated.

Anyone over the age of 16 can apply, but good marks in maths and science increase the chances of being selected. Apprentices are indentured in terms of the Manpower Training Act. The employer pays for the training.

Learnerships

A learnership is a vocational learning and training programme that combines theory and practice. It leads to an occupational qualification that is registered with the South African Qualifications Authority (SAQA) and recognised throughout the country.

Learnerships are available to school and college leavers, unemployed people, and those already employed. To enter a learnership programme, an unemployed learner registers with the Department of

Labour as a work seeker and, if offered admission, signs an agreement and a contract of employment for the duration of the learnership. An employed person wishing to enter a programme should consult their company's human resources department for details.

Learnerships are free of charge, and learners receive an allowance paid by their employer. Programmes include classroom-based learning through an accredited training provider (at a training centre, college or university, for instance) and on-the-job training with the employer. They vary in length but normally last at least a year.

The emphasis of the programme is on outcomes, progress is assessed at various stages, and success is measured in terms of the actual skills acquired. The learner comes to understand the theory that supports practice. On successful completion of a learnership, the learner earns a qualification and a certificate of competence.

The Department of Water Affairs Learning Academy was established in response to specific scarce and technical skill-related issues that affect the water sector.

The Academy's objectives are to secure a steady supply of high-level skills in water-related science, engineering, and management to meet the demand in the water sector.

The Academy supports academic programmes through bursaries and experiential training (internships). In addition young, inexperienced graduates are mentored in on-the-job training, and participate in projects, and attend specialised training interventions.

Internships
An internship is a temporary position in a company that provides work experience through supervised, on-the-job training. Internships are usually offered to university graduates. Interns are usually paid a small stipend by the company.

Adult Education and Training
ABET provides an opportunity for continued education for those that have not completed grade 9 or 10 and cannot study further because they lack the minimum requirements.

ABET is offered by many large employers at the place of work. It is flexible, offering part or full time study and usually designed around the needs of the learners.
It provides access to nationally recognised certificates.

Skills programmes
Skills programmes are short learning programmes that are either stand-alone courses or part courses towards a full qualification. They are job focused and are often a response to a skills need in a particular industry.

FET colleges

FET colleges offer vocational education and training (VET) from grade 10 to grade 12, and higher education up to three years post-grade 12. Here you can train as an

artisan, and register for full-time, part-time, and distance education programmes.

Programmes at FET colleges combine theory and practice, so students who qualify can start working productively as soon as they find a job. Students obtain certificates or diplomas for post-school programmes, depending on the type and length of the programme.

Below are some of the courses offered by FET colleges.

Engineering studies
Specific study fields such as electrical, mechanical, civil, and utilities/production engineering can lead to careers in areas such as civil, mechanical, or electrical engineering; building; fitting and turning; plumbing.

Business studies
Specific study fields such as secretarial, personnel management, public relations, small business development, and bookkeeping can lead to careers in management, credit control, accounting, clerical, or secretarial work.

Universities of technology

Universities of technology provide academic education leading to diplomas and degrees and practical hands-on training in a wide range of specialised careers. They train technologists, not artisans.

Many of their programmes help students to prepare for work in specific jobs. They cover specialised occupations and careers in the fields of applied engineering; biological, chemical and physical sciences; and applied commercial sciences; humanities, arts, and teacher education.

To study at one of these institutions, you need at least a senior certificate or an equivalent qualification, but the exact entrance requirement can vary from programme to programme and from institution to institution. Some faculties require specific compulsory school subjects, a personal interview, and/or an entrance test.

Some specialised study fields at these institutions that can prepare students for a range of jobs in the world of water are:

- accounting
- agriculture
- analytical chemistry
- biomedical technology
- biotechnology
- business administration
- computer systems
- cost and management accounting
- economic management analysis
- environmental sciences
- human resource management
- information technology, internal auditing
- laboratory management, nature conservation
- water care.

In the fields of engineering you can study chemical engineering, civil engineering, or electrical engineering specialising, for instance, in electronics or process instrumentation.

Bridging programmes

Students that do not meet the required university registration requirements, but would like to study further can enquire about attending special access programmes for courses in, for example, economic and management sciences, science, law, humanities and social sciences.

Such courses are offered at certain tertiary education institutions and also at private colleges around South Africa. One-year courses, for example, are available to help students upgrade their marks in mathematics, physical science, and accounting, or to prepare students for further study towards careers in auditing or in electronic, computer, or mechanical engineering.

Universities

Many water-related careers require completion of undergraduate or postgraduate degrees, with specific subjects taken at different levels. To study for an undergraduate degree at a university in South Africa, you will normally need at least a senior certificate with full university exemption. Certain degrees and faculties have additional minimum requirements.

All universities use a point rating system, which differs from university to university. Some degrees may require an admissions test and/or a personal interview. Here are some examples of faculties, bachelor degrees, fields of study, and minimum admission requirements. For details, consult the current calendar of the institutions of your choice.

University and university of technology faculty entrance requirements

University of the North West

http://www.nwu.ac.za/prospective-students/courses-potchefstroom#natuurwetenskappe

Faculty	Bachelor degrees	Examples of fields of study	APS	Admission requirements
Commerce, Law and Management	BCom	Accountancy; Economic and Business Sciences; Law	30	• University entrance • Mathematics level 4 • Selection takes place • Language requirement: A pass rate of 50%-59% (level 4) in the language of instruction for Home language or 60%-69% (level 5) in the language of instruction at First Additional Language level
Engineering and the Built Environment	BIng	Chemical and Metallurgical Engineering; Civil and Environmental Engineering; Construction Economics and Management; Electrical and Information Engineering; Mechanical, Industrial and Aeronautical Engineering; Mining Engineering	31	• University entrance • Mathematics level 6 (70%-80%) and Physical Science level 5 (60%-70%) • Selection test
Health Sciences	BSc	Physiology; Public Health; Therapeutic Sciences; Centre for Health Science Education	24	• University entrance • Mathematics level 5 (60%-69%) and Physical Science level 4 (50%-59%)
Humanities	B Social Sciences	Arts; Education; Human and Community Development; Literature, Language and Media; Social Sciences	20	• University entrance

Science	BSc	Biological and Life Sciences; Animal, Plant and Environmental Sciences; Molecular and Cell Biology; Physical Sciences; Chemistry; Physics; Earth Sciences; Geography, Archaeology and Environmental Studies; Geosciences; Mathematical Sciences; Computer Science; Statistics and Actuarial Science	24	• University entrance • Mathematics level 4 (50%-59%) • Physical Science level 4 (50%-59%) • Mathematics level 5 (60%-69%) • Physical Science level 4 (50%-59%)

University of the Witwatersrand

http://www.wits.ac.za/prospective/undergraduate/admissionrequirements/11644/matricnsc.html

Faculty	Bachelor degrees	Examples of fields of study	APS	Admission requirements
Commerce, Law and Management	BCom	Accountancy; Economic and Business Sciences; Law	36	• English Home language or First add lang – 5 • Mathematics – 5 Applicants between 30-35 points with English and Maths at level 5 will be waitlisted subject to the number of places available.
Engineering and the Built Environment	BSc(Eng)	Chemical and Metallurgical Engineering; Civil and Environmental Engineering; Construction Economics and Management; Electrical and Information Engineering; Mechanical, Industrial and Aeronautical Engineering; Mining Engineering	36	• English HL or First add lang – 5 • Mathematics – 5 • Physical Science – 5 Provided that: a Maths pass at NSC Scale of Achievement level 5, a Physical Science pass at NSC Scale of Achievement level 5 and an English language pass at NSC Scale of achievement level 5 is obtained.

Health Sciences	BSc	Physiology; Public Health; Therapeutic Sciences; Centre for Health Science Education		• English Home language or First add lang – 5 • Mathematics - 5 • Life Sciences and / or Physical Science - 5
Humanities	BA	Arts; Education; Human and Community Development; Literature, Language and Media; Social Sciences	34	• English Home language or First add lang – 5
Science	BSc	Biological and Life Sciences; Animal, Plant and Environmental Sciences; Molecular and Cell Biology; Physical Sciences; Chemistry; Physics; Earth Sciences; Geography, Archaeology and Environmental Studies; Geosciences; Mathematical Sciences; Computer Science; Statistics and Actuarial Science	40	• English Home language or First add lang – 4 • Mathematics – 4/6

WATER-RELATED CAREERS

THE WATER CYCLE

Water circulates continually between the earth and the atmosphere. This circulation is known as the water or hydrological cycle. Because we rely on it for all our water needs, we need to appreciate how this cycle works if we want to understand water resources and how best to manage them.

Water is available in nature as a solid, a liquid, or a gas: as ice, snow, water, and steam (water vapour). This is how the cycle works:

1. **Evaporation** – the sun evaporates water from oceans, lakes, and rivers, for example, or plants transpire water into the atmosphere
2. **Condensation** – as the air filled with moisture rises, it cools and condenses into clouds
3. **Precipitation** – the water in the clouds falls back to the earth as rain, snow, sleet, or hail (such precipitation can happen in minutes or hours)
4. **Surface runoff** – some of the rain runs into streams and rivers and returns to the oceans (this can take days)
5. **Infiltration** – some of the water infiltrates the soil and is evaporated directly; some of it moves through the roots of plants and is transpired by the leaves
6. **Percolation** – other water percolates or seeps deeper into groundwater aquifers (layers of rocks or soil underground that are able to hold water). In arctic regions, groundwater may be frozen. It can take decades, centuries, or even millions of years for water in deep underground aquifers to join the hydrological cycle.


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06
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05

The hydrological cycle is what links the different water resources – rivers, wetlands, estuaries, and groundwater.

Plants, animals, people, and communities all need water. It is used domestically; and in science, industry, and agriculture – as a solvent or as a catalyst, for instance, and for diluting, cooling, and cleansing.

People interrupt the natural water cycle to obtain water when and where they need it. For example, we sink boreholes and build dams and storage reservoirs to supply municipal, industrial, and agricultural water needs, and we return treated wastewater to our lakes and streams.

The activities of people, animals, and plants create the biophysical environment of our water resources. These resources need to be managed in an integrated way, taking into account all the relationships between water and the activities that surround it, as well as social, economic, and political issues.

Only a small part of all the Earth's water is fresh water; most water occurs in other forms – as salt water in the oceans, ice in ice caps and glaciers, or hot, mineral rich water deep in the earth. The purest natural form of water is probably snow, and the next purest is rain, even though it contains dissolved gases from the air. Mountain streams are relatively pure, but lowland rivers can be highly polluted by industrial or human waste and bacteria.

Groundwater is particularly important to humans, as it is the largest reserve of drinkable water. Because it has filtered through the ground, it has less organic contamination than river water. It may appear at the surface in the form of springs, or we can reach it through wells and boreholes.

South Africa has limited supplies of water, so it needs skilled and qualified people to look after its water resources and each part of the water cycle to make sure there is enough of the right quality water to serve all our needs.

PEOPLE WHO WORK IN THE WORLD OF WATER

Section 2 lists careers alphabetically that relate directly or indirectly to eight different segments of the cycle of work in the world of water. It describes the different types of work in some detail. This part of the introduction defines those eight segments broadly and indicates where some of the careers fit into the larger picture.

Water as a resource

Water resources need to be managed so everyone can benefit from them, now and in the future. We need to find a balance

between protecting these resources and using them efficiently and fairly. People with careers in the area of water resources are responsible for finding water and monitoring, analysing, and conserving it.

There are various pieces of legislation that regulate the use of water in South Africa. These are the National Water Act (Act 36 of 1998), the National Water Amendment Act (Act 45 of 1999), the Water Services Amendment Act (Act 30 0f 2004).

The National Water Act regulates the way in which surface water (i.e. water that is above the ground) and groundwater (i.e. water that is underground) are protected, used, developed, conserved, managed, and controlled in a sustainable and equitable manner for the benefit of everyone in the country, while also protecting the environment.

The Department of Water Affairs (DWA) sets the national objectives, and, in each of South Africa's water management areas, there is a catchment management agency responsible for protecting the catchments and aquifers in its area (i.e. maintaining the quality of surface and groundwater for use in an ecologically sustainable way, preventing the degradation of rivers and aquifers, and rehabilitating them).

To protect and use water resources properly, we need information about:

- The quantity, quality, and reliability of fresh water. Where can we find it? Can we drink it? Is there enough for our future needs?
- The effect of human activities on water resources and the hydrological cycle. Too many boreholes can use up the groundwater; chemicals and mining can pollute rivers and dams; soil erosion can speed up evaporation
- The effect of natural phenomena on water resources. Global climate change could alter rainfall patterns; droughts and floods need to be managed
- Water-linked ecosystems such as rivers, estuaries, and wetlands, and how to protect, sustain, and rehabilitate them after people have polluted them or mined them or introduced alien plants and animals, for example.

Water resource management maintains reliable water supplies for human needs and protects the environment. Clean, reliable water supply is vital for human health and for economic development through its use in commerce, industry, and agriculture.

People who manage water resources consider the availability of water, how much is needed, and for what particular uses. They need to protect the health of these resources by taking into account the animals that live there and the plants or vegetation that surround them. People working with water resources need to understand current and future demand for water.

They consider options for meeting it by means of new resources (such as dams and reservoirs) and by means of ensuring that enough is reserved to provide for basic human needs and to protect water ecosystems. They also try to manage

demand through changing technology and by trying to change people's behaviour in the way they use water.

Some positions in the field of water resource management are: water resource planner, water resource engineer, water resource analyst, water resource economist, hydrologist, hydrogeologist, and hydro-ecologist.

To enter such fields you could be a graduate in a discipline such as geography, environmental science, engineering, or economics, or hold a postgraduate degree in water resources or engineering hydrology. There are also many opportunities for social scientists.

Preparing water for distribution

The next step in the process of providing water for society's needs is to make it available. People employed in this area may be involved in water storage, for instance. Others are responsible for making it possible to have efficient access to water for the purpose of drawing it, transporting it further, treating it, and preparing it for safe use.

As the public trustee of the national water resources, the DWA develops, operates, and maintains inter-basin transfer schemes and storage dams used to store raw water in bulk. But, with a licence or other authorisation to do so, any institution or person can build and operate a dam.

There are many different career opportunities here for people with all levels of qualifications.

There is work for all types of engineers – civil engineers who build dams and reservoirs; mechanical engineers and electrical engineers; as well as for surveyors, electricians, fitter and turners, and plumbers. There is also a great need for specialists working in areas of science such as ecology, hydrology, microbiology, and for laboratory analysts and others who provide crucial support.

Treatment of raw water

Careers in the area of water treatment are available in two important parts of the cycle of water use. First, we need people who treat water before it is used – before it reaches our taps, for example – that is, treatment of raw water and preparing it for its different users. Secondly, we need people who treat water after it has been used by people and industries, that is, treatment of wastewater to dispose of it safely or to make it safe and ready for further use.

The same basic qualifications apply to both aspects of water treatment, but they are applied very differently. (For an outline of careers that apply to both aspects of water treatment, see the Water Treatment overview.)

Water supply

We need water at home, at work, and in the economy (e.g. in urban centres and rural areas, in mining, agriculture, and industry).

People with careers in water supply make sure that we have enough water for all these uses. They can work for large employers, such as a water services authority or water board, and for a host of others essential in the supply chain.

The water services authority (municipality) is responsible for making sure that the infrastructure for reticulation (the overall supply network) is developed, operated, and maintained.

Bulk water services providers are responsible for developing, operating and maintaining abstraction works for drawing water; bulk potable (drinking) water treatment plants and pump stations; and reservoirs and pipelines for distributing clean water to municipal reservoirs.

The activities of water services authorities are regulated by the Water Services Amendment Act (Act 30 0f 2004), which deals mainly with water services or potable water and sanitation services supplied by municipalities to households and other municipal water users.

A water board provides bulk treated water and may be contracted as a service provider. The water services authority is responsible for water and sanitation systems, and it may contract another provider to develop, operate, and maintain the infrastructure, manage revenue collection and customer relations, and promote health and hygiene awareness.

Pipeline networks underground carry clean water and wastewater. They distribute the water from the water treatment works to taps for domestic and commercial use, through metallic and non-metallic pipes. They also bring water to the treatment works from various sources – rivers, reservoirs that collect upland stream water, and boreholes where the water is pumped from underground aquifers. Wastewater pipes (or sewers) take sewage away from

properties to the sewage treatment works, and other networks discharge purified water into streams or rivers, or into the sea.

Managing pipe networks needs design knowledge for new pipelines, refurbishment of existing pipelines, and analysis of the network to determine effects of age and demand that could lead to bursts, or inadequate water quality or pressure. Pipeline engineers and technicians work to ensure that pipes are correctly laid, used, maintained, inspected, and repaired.

Large-scale plants and systems transport and treat huge quantities of water and wastewater to ensure continuous clean water for drinking, irrigation, industry, and household use.

Skilled operators control the processes, monitor operations, conduct maintenance and repair work, and report results. They are trained in mechanics, hydraulics, computer science, biology, and chemistry, among others.

Supplying water also involves storing, purifying, and distributing water, by pipeline or carrier to wherever it is needed. It needs people who operate dams, pumping stations, and reservoirs, and in a variety of auxiliary careers. It also needs people to construct, operate, and maintain the systems that supply and distribute water.

Water use

Water use refers to activities that have an impact on a water resource, that is, activities that affect the amount of water in a water resource, the quality of that water, and the environment. Examples include reducing stream flow, discharging waste into a water resource, or removing underground water.

In agriculture, water is needed to produce food, fibre, fuel-wood, and timber. Such use can help to reduce poverty and increase the earnings of people who depend on water-based agriculture, including subsistence, emergent, and commercial farmers. People with water-related careers in agriculture are responsible for creating and applying water-efficient production technologies, for finding practical solutions to problems, and for protecting water resources. They encourage efficient use of water and manage water quality for irrigation of crops, livestock watering, and aquaculture in rivers, ponds, and dams.

Plantations can stop rivers from flowing and reduce the amount of water that percolates into underground aquifers. Farming and forestry can pollute surface and groundwater with chemicals from fertilizers, pesticides, and herbicides. Drawing water from rivers, dams, and boreholes affects the natural environment. So people are needed in careers that protect our terrestrial and aquatic ecosystems.

Mines and industries produce high concentrations of waste and effluents that can seep into underground water and degrade the water quality. People with careers in water related to mines and industries are concerned with treating and disposing of wastes (including

sewage, effluents, polluted drainage, and solid wastes) and with developing and promoting management systems, technologies, and processes that allow water to be used more efficiently and that reduce pollution. This could involve investigating the possibilities of recovering waste and reusing it as an energy source or selling it.

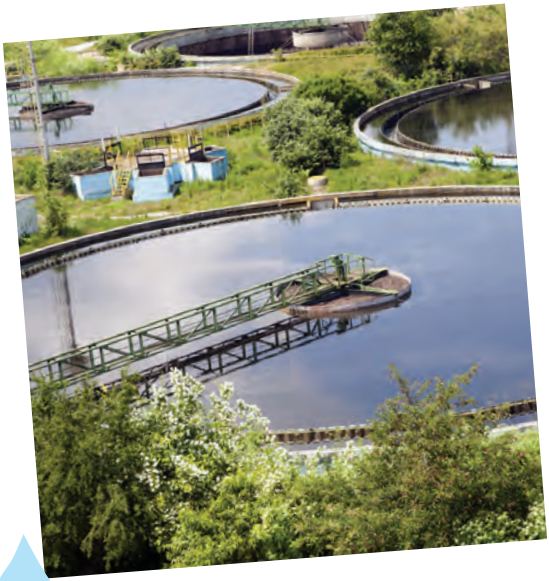
Water use of national and strategic importance also offers careers of various kinds such as work in the use of water to generate electricity, or in the service of inter-catchment water transfers (where water in a management area that has surplus water is transferred to another management area that has too little water for its needs).

The National Water Act provides for the establishment of water user associations. Water user associations are water management institutions whose primary purpose, unlike catchment management agencies, is not water management. They operate at a localised level, and are co-operative associations of individual water users that wish to undertake water-related activities to prevent water wastage, or to protect water resources, or to regulate the flow of watercourses. Water user associations may be former irrigation boards, or be established for stream flow activities such as afforestation, or for the treatment and disposal of effluent and waste, or to control water use for recreational purposes. A group of farmers, for instance, might form a water user association to build a common dam or canal, or a group of emerging farmers might form a water user association to pool their resources for mutual benefit. Managing and advising such associations provides work opportunities for many different areas of expertise.

Water treatment (overview)

People with careers in water treatment may work either in the area of the treatment of raw water or in the area of wastewater treatment and sanitation.

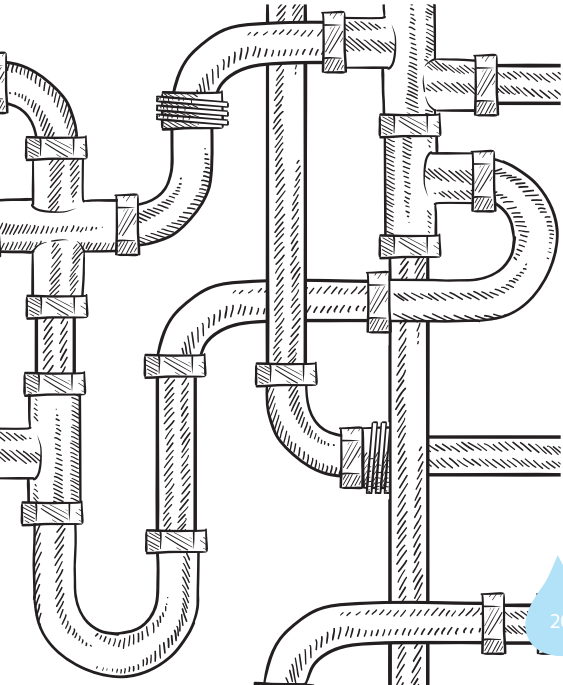
Those who treat raw water make sure that our water does not have harmful bacteria or chemicals in it and that drinking water is drinkable. Those who work in wastewater treatment and sanitation (that is, in the treatment of water after it has already been used), treat wastewater to remove or neutralise harmful organic and inorganic matter, for example human excreta or chemicals used in agricultural, mining and industry.



Natural processes as well as human activities add different pollutants and contaminants to water. Surface water found in nature can alter chemically as it comes into contact with soil and other materials; use of water in municipal, industrial, and agricultural activities adds organic and inorganic pollutants to water.

We consider water quality only in the context of the use to which it is to be put. Water high in plant nutrients, such as treated domestic sewage, can provide excellent water for irrigation, but could cause serious problems if it were discharged into a source of drinking water. The challenge is to provide the right quality of water for the right use and at the right price.

Early in the water cycle, raw water is pumped from wells, rivers, and streams to water treatment plants. There it is treated and then distributed to customers. After it has been used by the customers it becomes wastewater. Liquid waste travels through sewage pipes to liquid waste treatment plants where it is treated. It could then be returned to streams, rivers, and oceans, or reused for irrigation and landscaping. Operators in both types of water treatment plant control the processes and equipment that removes or destroys harmful materials, chemicals, and micro-organisms from the water.

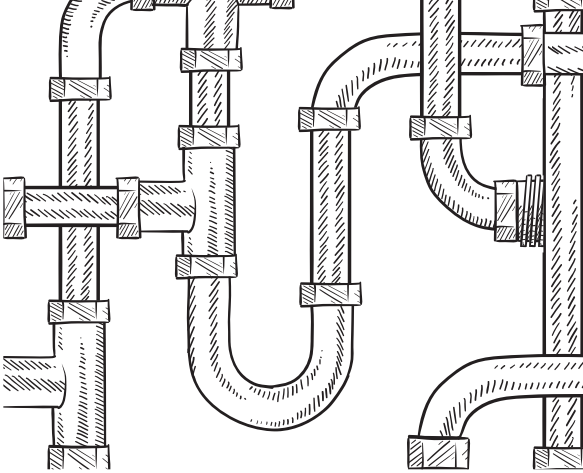


Work opportunities are wide-ranging in raw water treatment and in wastewater treatment and sanitation. There is work for raw water treatment and wastewater treatment plant operating staff at all levels; for network engineers who design sewage and water distribution networks; for analytical chemists and other specialist laboratory-based scientists; for laboratory and field technicians who sample and analyse raw water and wastewater samples; for desalination and filtration plant operators; and for regulators responsible for monitoring the quality of wastewater that is discharged into rivers or the sea, for example.

Auxiliary and support services

People providing auxiliary services look after the various service needs of different communities of water users. They include those who educate customers in responsible water use, and who make the arrangements for ensuring that safe water reaches everyone who needs it. Surrounding every area of water-related work people

are needed to offer support services. Large water facilities have big budgets and many employees. They need managers, accounting personnel, administrators, clerks, legal expertise, and people who can provide training and IT support, and many other functions. Support staff are essential for enabling such facilities to operate reliably or cost-effectively.



INTERACTION OF JOBS

THE WORK OF A WATER AND SANITATION SERVICES AUTHORITY

A typical water and sanitation services authority in a municipal area is responsible for serving the needs of large numbers of domestic, commercial, and industrial customers. It might, for example, operate an extensive water mains network for distribution; dams, water reservoirs, or water towers for collection and storage; sludge plants, filter plants, and biological reactors for water treatment; and waste treatment works for raw sewage, before high quality effluent is discharged, contributing to a river's regeneration and the protection of the environment.

Many careers and positions combine and interact at each stage to make these processes work smoothly and to deliver the requisite services. Here is a summary of an overarching context and organization structure that brings them together.
The actual work of water and sanitation provision may be done internally, within the services authority's own organization and by its own employees, or, depending on local conditions and size, some of the work may be outsourced to a water services provider. The examples below show the types of responsibility that a service authority or provider may have and the work that its staff or subcontractors might need to do.

- The **municipal manager/chief executive** of a water and sanitation services provider and her/his team acts as manager and is responsible for the work of the utility and its divisions, and for compliance with all laws and regulations.
- **Laboratory staff** conduct routine analyses and monitor water quality at pump stations and across the supply chain. They report on any problems they may encounter.
- **Scientific staff** act as experts and advisers, whose role it is to solve problems with regard to water quality or effluent, or, more broadly, as surveyors or cartographers and to recommend ways to optimise the work of the utility.
- **Research and development** is the contribution made by scientists, researchers, and technologists.

More advanced research and development support is often provided by universities or science councils. There are job opportunities for a variety of different kinds of researchers specialising in the world of water, including aquatic scientists, hydrologists, geohydrologists, and many others.

- **Operations staff** ensure that the processes and plants work. They include managers (such as superintendents, works managers, district managers, and regional managers) and process controllers that run the various plants. It is in the operations area that the practical day-to-day job gets done. Operational skills are urgently needed across the country for people with technical diplomas or degrees.
- **Technical services** provide mechanical and engineering maintenance expertise in all areas of water provision. In this area, too, South Africa is short of skilled people and offers many job opportunities.
- **Planning** has to do with assessing the need for current and future capital infrastructure and equipment, based on population assessments, economics, customer requirements, and water availability, as well as on the work of regional and town planners who decide on new developments that in turn require sewers and delivery of water services. This involves planning for expenditure and for project management.
- **Information technology, human resources, legal services, finance,** and **corporate communication staff,** both within and from outside the organisation, play a crucial role ensuring that the service provider's work is done efficiently and responsibly. Careers in these fields are core to any business.
- **Consultants** are used to do work that the staff of a services authority or provider do not have the specialist expertise, knowledge, or skills to carry out themselves. They offer expertise that may be required for particular projects, and could include IT specialists, design, project management or consulting engineers.

Section 2: Careers across the Water Cycle

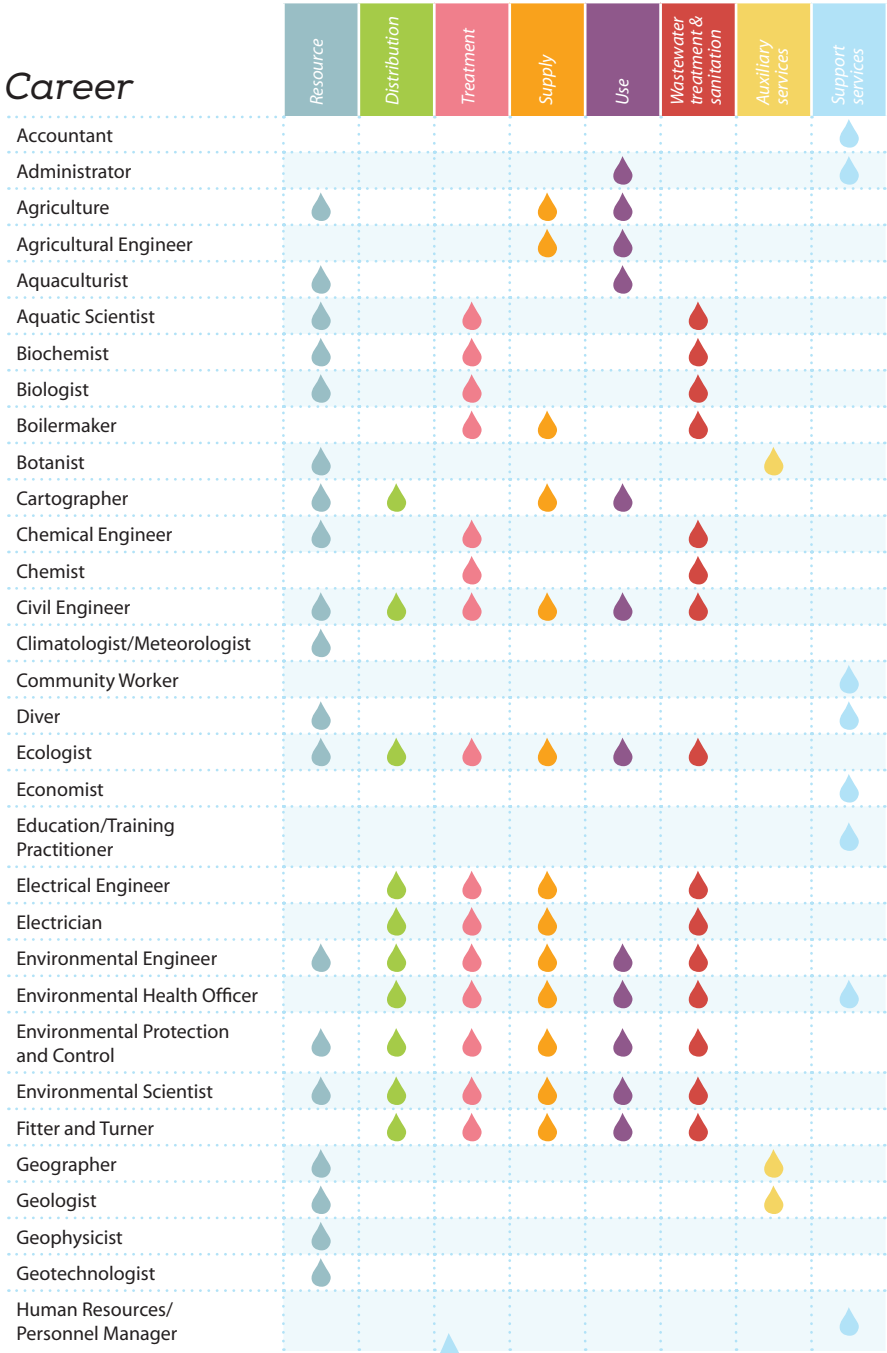
No matter what you are good at or enjoy doing, or what kind of education or training you have, there is a job for you in the world of water that is interesting and worth doing.

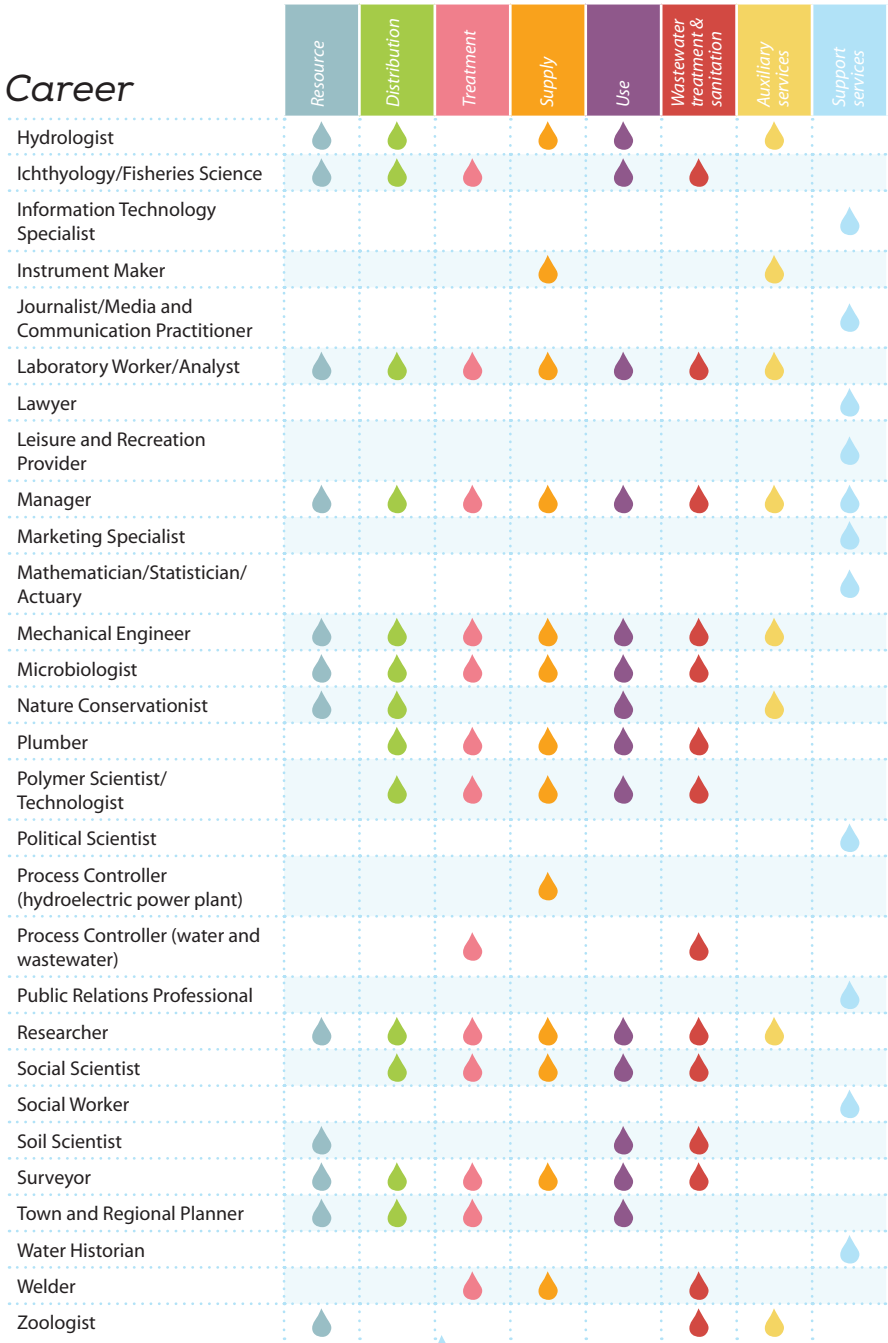
** An asterisk after the name of a career listed as a specialisation or related occupation indicates that this career is described more fully elsewhere in this guide. (For a list of careers, consult the Index.)*

KEY TO WATER CYCLE COLOUR CODES

The colours of the columns in the table (p24 and p25) that represent areas of the water cycle are repeated next to each career listed in this section, and these colour codes tell you in which parts of the water cycle you will make a contribution if you choose any one of these careers.

- *Water as a resource*
- *Preparing water for distribution*
- *Treatment of 'raw' water*
- *Water supply*
- *Water use*
- *Wastewater treatment and sanitation*
- *Auxiliary services*
- *Support services*


Career
Resource
Distribution
Treatment
Supply
Use
Wastewater treatment & sanitation
Auxiliary services
Support services
Accountant
Administrator
Agriculture
Agricultural Engineer
Aquaculturist
Aquatic Scientist
Biochemist
Biologist
Boilermaker
Botanist
Cartographer
Chemical Engineer
Chemist
Civil Engineer
Climatologist/Meteorologist
Community Worker
Diver
Ecologist
Economist
Education/Training Practitioner
Electrical Engineer
Electrician
Environmental Engineer
Environmental Health Officer
Environmental Protection and Control
Environmental Scientist
Fitter and Turner
Geographer
Geologist
Geophysicist
Geotechnologist
Human Resources/ Personnel Manager


Career
Resource
Distribution
Treatment
Supply
Use
Wastewater treatment & sanitation
Auxiliary services
Support services
Hydrologist
Ichthyology/Fisheries Science
Information Technology Specialist
Instrument Maker
Journalist/Media and Communication Practitioner
Laboratory Worker/Analyst
Lawyer
Leisure and Recreation Provider
Manager
Marketing Specialist
Mathematician/Statistician/ Actuary
Mechanical Engineer
Microbiologist
Nature Conservationist
Plumber
Polymer Scientist/ Technologist
Political Scientist
Process Controller (hydroelectric power plant)
Process Controller (water and wastewater)
Public Relations Professional
Researcher
Social Scientist
Social Worker
Soil Scientist
Surveyor
Town and Regional Planner
Water Historian
Welder
Zoologist

Accountant

There are many careers in the financial areas of water-related organisations for those who want to work close to the economic heart of an organisation. All institutions need qualified, skilled workers.

Professional associations play a key role in the qualification structure and the organisation of education and training in this sector. It is advisable, therefore, to contact the finance sector SETAs for advice should you wish to enter this type of employment. Many of the functions performed in the financial sector are strictly regulated by professional bodies, legislation and government policy.

Most people employed in finance are in managerial, professional and semi-professional positions.

Professionals are mainly accountants, auditors, financial and management consultants, and banking investment managers.

As an accountant, you will prepare financial statements, budgets, accounting systems, and cash flows so that managers can make sensible business decisions and improve profits. Here are some accounting careers:

- **Chartered accountant** – works in all fields of business and finance, including audit, taxation, financial and general management
- **Cost accountant** – collects, analyses, summarises, and evaluates products, manufacturing, and other processes
- **Financial accountant** – gives advice about planning and arranging finance (e.g. for mergers and acquisitions, buying assets, and managing investments), prepares financial statements for decision makers
- **Accountant and management consultant** – advises businesses about procedures to follow when administering finances and secretarial matters
- **Financial manager** – prepares company accounts and financial reports and gives information about the money needed to run a business
- **Auditor** – examines the accounting records of a business, certifies them as being correct, and gives financial advice
- **Credit controller** – opens new accounts for clients, monitors their payment, and checks the credit worthiness of those who apply to open accounts
- **Bookkeeper** – keeps financial records, and computes, classifies, and verifies the information.

Other careers include actuaries, financial analysts, valuers/appraisers, taxation specialists, bankers, economists*, company secretaries, investment analysts, bursars, and treasurers.

What will I do in this career?

- Examine financial information and give advice about running a business and protecting investments


CORPORATE
TAXATION
TAX
FISCAL
DEBT
DEBIT
JOB
LAW
ACCOUNTING
REDUCED
INCOME
GOVERNMENT
PROFIT
ECONOMY
BALANCE
CORPORATE
INCOME
27

- Record debits and credits
- Compare past and present balance sheets
- Prepare reports for managers and bank officials
- Help to draw up budgets and accounting policies
- Examine the costs of operating a business, institution or organisation, as well as its income and expenditure
- Ensure adherence to legislation and regulation by financial bodies such as the Financial Services Board
- Liaise with banks, stakeholders and brokers.

Qualifications and training

These include:

University degrees

- BCom Accounting Sciences; Business Management; Communication Management; Econometrics; Economics; Entrepreneurship; Financial Management; Human Resources Management; Internal Auditing; Marketing Management; Statistics; Supply Chain Management
- BAdmin International Relations; Public Management.

National certificates and national diplomas

- National Certificate: Small Business Financial Management; Office Administration; Business Accounting
- Certificate: Local Government Accounting; General Internal Auditing; Public Sector Accounting
- National Diploma: Management Accounting; Accounting Technician; Technical Financial Accountant
- Diploma: Financial Accounting (IAC Accounting Officer)

Additional professional qualifications

- Professional Qualification: Chartered Certified Accountant; Chartered Management Accountant
- Chartered Accountant: Auditing; Financial Management

Learnerships

- Chartered Certified Accountant offered by the Association of Chartered Certified Accountants (ACCA)
- Certified Accounting Technician
- Chartered Management Accountant
- National Diploma: Management Accounting offered by the Chartered Institute of Management Accountants (CIMA)
- Postgraduate: Professional Accountant in Business and Postgraduate Diploma: Professional Accountant in Practice offered by the South African Institute of Professional Accountants (SAIPA)
- Associate accounting technician
- Business administrator
- Office administrator
- Registered accounting clerk
- Registered bookkeeper

Graduate development programmes

Postgraduate diplomas are awarded to students with bachelor's degrees and/or who have successfully fulfilled the requirements of honours, master's or doctoral programmes, or to those who have passed the examinations set by professional bodies.

- BANKSETA development programme – the International Executive Development Programme complements the executive development programmes offered by employers in the sector. It is a fully funded programme that develops high-potential senior managers
- FASSET development programmes facilitate skills development and transform and uplift the financial and accounting sector.

***Note**: To practise as a chartered accountant – a CA(SA) – you need: a bachelor's degree plus an honours degree or a CTA; to enter into articles of clerkship for three years while working for a firm of accountants in public practice; to pass the Public Accountants and Auditors Board final qualifying examination; to apply to the South African Institute of Chartered Accountants for membership; and to register with the Public Accountants and Auditors Board.*

Who will employ me?

Everybody needs people with accounting skills.

Where can I find out more?

SA Institute of Chartered Accountants; Public Accountants' and Auditors' Board; Financial and Accounting Services Sector Education and Training Authority (FASSET).

Administrator

Administrators and clerks do all the general office work that helps other professional staff and managers to do their jobs. If you work in administration you will have a range of tasks such as keeping records, writing up accounts, preparing and typing reports and letters, and filing. You will spend most of your time in the office.

Depending on your level of training, you could be in charge of a company's administration, or you could become an office manager, bookkeeper, cashier, personal assistant, typist or secretary, or receptionist.

Management and business degrees provide students with business management principles and skills at all levels – that is, it introduces them to business processes and systems. Employment opportunities are available in administration, finance, marketing and human resources management.

What will I do in this career?

- **Company secretary** – carries out the legal duties of a business, such as keeping records and providing any information that the law requires, and taking charge of the company's administration

- **Finance clerk** – makes entries in cash books, journals, and ledgers for the financial records
- **Personnel clerk** – helps the personnel or human resources manager* by keeping staff records, reports, regulations, and manuals up to date
- **Registry clerk** – opens, sorts, records, and distributes all incoming mail
- **Stores clerk** – helps with the purchase and control of stock such as stationery, furniture, and other company equipment.

Qualifications and training

These include:

University degrees

- BA: Management
- BComm: Management
- BBusAdmin
- BBusAdmin: Information Management
- BAdmin: Public Management and Administration
- BCom/LLB

National certificates and national diplomas

- National Certificate: N5 Business Management
- Diploma: Advanced Management
- Diplomas and certificates from FET and private colleges – Typing, Accounting, Office Routine, Communication
- National Diploma: Public Management and Administration; Government Finance; Inventory and Stores Management; Public and Development Management; Business Studies; Credit Control
- Advanced Certificate: Business Administration; Accounting and Business Administration

Learnerships

- In-service training

Who will employ me?

All organizations employ administrative officers and clerks, including businesses, government departments, local authorities, and educational institutions.

Where can I find out more?

Institute of Business Studies (IBS); Institution of Administration and Commerce (IAC); Financial and Accounting Services Sector Education and Training Authority (FASSET); Services SETA (SSETA).

Agriculture

Providing food for the world's ever-increasing population is a global priority. This is especially relevant in Africa where the highest levels of hunger occur. Sustainable agriculture is critical to the survival of all the people of the world.

Agriculturists around the world are focusing on 'sustainable intensification' – that is, doing more with less. This involves long-term food security and export growth while preserving the safe water, clean air, natural ecosystems and biodiversity vital for our future wellbeing.

Agriculture is the largest single sector of the economy and employs about five million people in commercial and small-scale farming. Agricultural activities include rearing livestock and growing crops.

There are excellent careers in the fields of developing agriculture, research, project management, forestry, water resources, food production, consulting and environmental conservation. The business and management side of agriculture are increasingly important. Opportunities include:

- **Agriculturist** – is a scientist who specialises in improving agricultural production, and may also be involved in agricultural research. An agriculturist may specialise in irrigation, crop production, animals, or weed and pest control. If you are working in irrigation, for instance, you would investigate and solve irrigation problems and develop new and better ways to supply water
- **Agricultural adviser** – helps and advises farmers, agricultural businesses, rural industries, and government to produce, process, and distribute farm products. You may specialise in areas such as water use, animal husbandry, crops, fruit production, farm economics, or land management
- **Agricultural biotechnologist** – uses techniques such as genetic engineering to improve the quality and diversity of plant and animal products
- **Agricultural/resource economist** – studies the economic aspects of the efficient use of agricultural, pastoral, fishing, and forest resources. Economic principles are applied to managing farms, marketing, and natural resource policies. Agricultural economists' broad knowledge of agriculture, commerce and social science also enables them to solve problems in areas such as agricultural development, finance, international trade and market development, processing, distribution and purchasing. Resource economics focuses on the use and preservation of natural resources such as air and water; addressing pollution problems; assessing land-use policy; and evaluating environmental resources
- **Agricultural entomologist** – investigates the reasons for insect infestations and researches ways to

control them using integrated pest management, biological control, and chemicals
- **Agricultural manager** – studies agricultural economics. The main purpose of this field is to increase the managerial efficiency of farmers/managers to ensure sustainable and profitable agricultural production.

What will I do in this career?

- Study the effects of agriculture on the environment by collecting and analysing samples of groundwater, soil, and plants
- Conduct experiments in controlled environments to develop better farming methods
- Give technical and scientific information to farmers and commercial firms that trade in agricultural goods and produce
- Help farmers to plan and monitor agricultural activities, and diagnose, treat, and manage problems that arise (e.g. nutrient disorders in plants and animals; weeds and plant diseases)
- Develop scientific methods for breeding, caring for and managing farm animals
- Train and coordinate the work of technicians and fieldworkers
- At senior levels – supervise and coordinate research teams, prepare funding applications, communicate research results, prepare policy advice, and help enact government policy.

Qualifications and training

These include:

University degrees

- BAgric Management
- BAgric: Agricultural Economics; Crop Science; Extension; Rural Resource Management; Soil Science
- BForestry
- BHuman Ecology: Community Agriculture
- BInstitutional Agriculture: Agronomy: Horticulture; Crop Protection; Land-use Planning
- BSc: Agriculture: Agribusiness; Agriculture: Agribusiness Management; Agronomy; Biochemistry; Commercial Forestry; Crop Science; Cultivated Pastures; Environmental Microbiology; Grassland Science; Horticulture
- BSc: Soil Science; Water Resource Management; Agriculture; Agricultural Economics; Agricultural Economic Analysis
- BTech: Agricultural Management; Forestry; Horticulture; Water Care; Animal Production; Crop Production; Mixed Farming; Agricultural; Rural Development and Extension
- BA(Hons): Land Reform and Rural Development

National certificates and national diplomas

- Postgraduate Diploma: Agricultural Economics; Agricultural Extension; Agriculture; Agriculture and Rural Engineering; Food Security
- Advanced Postgraduate Diploma: Land Information Management
- Certificate: Agriculture; Forestry; Irrigation; Community Agriculture
- Diploma: Agriculture; Agricultural Research
- National Diploma: Agricultural

Extension; Community Extension; Rural Development; Agricultural Management; Forestry; Horticulture; Water Care; Agricultural Extension; Farming Management
- FET Certificate: Fisheries Resource Compliance
- General Education and Training Certificate: Horticulture
- National Certificate: Agriculture; Agricultural Management; Horticulture; Forestry; Water Care; Community Extension; Agri Trade Processes; Agricultural Extension
- National Higher Certificate: Forestry; Water Care
- Advanced Diploma: Sustainable Agriculture in Rural Development
- National Higher Diploma (Agriculture) – Poultry Production Management; Pig Production Management

Learnerships
- Informal training includes a variety of short courses for commercial farmers such as Financial Planning and Management, Strategic Approach to Farming Success
- Short courses for emerging farmers include Farm Management, Budgets, Cashflow, and Balance Sheet
- AgriSETA offers a large number of learnerships from Agronomy to Rooibos Culture Practices.

Graduate development programmes
- Rainbow Farms (Pty) Ltd offers a group graduate programme focused on developing individuals for technical and managerial responsibility. The minimum entry qualification is a BSc.
- The South African Sugar Association offers an agricultural/biological science graduate programme in KwaZulu-Natal. Requirements are for graduates with a National Diploma, Bachelor's Degree and/or Postgraduate Degree in agriculture.
- The Department of Water Affairs Learning Academy offers graduate training for a minimum of three years.

Note: *Study at an agricultural college does not lead to registration as an agriculturist.*

Who will employ me?

Department of Agriculture; commercial organisations (e.g. manufacturers of agricultural remedies, food companies); industrial companies; government and private research institutes; further and higher education institutions; SABS; agricultural unions; co-operatives; large farming operations; self-employment (e.g. as an agricultural consultant); the CSIR and South African National Parks.

Where can I find out more?

Agricultural Research Council; Institute for Soil, Climate, and Water; AgriSETA.

Agricultural Engineer

An agricultural engineer knows about engineering science and technology (mechanical, civil, and electronic) as well as agriculture, and helps to solve problems to do with farming and managing natural resources. In this career, you could work indoors in a design office or laboratory, or outdoors on farms, in forests, or on a research station. Some similar careers include agricultural scientist, civil engineer*, aquaculturist*, soil scientist*, environment engineer*, mechanical engineer*, and irrigation engineer.

An Agricultural engineer is trained to apply engineering science and technology to agricultural production and processes, for example the equipment required for supplying water or planting and harvesting.

- **Agricultural microbiologist** – identifies and controls organisms responsible for disease, and often works in specialised areas such as food technology and environment management
- **Agronomist** – studies the influence of climate, soil, and different means of production on the way in which crops grow and develop
- **Agricultural technician** – is concerned with the practical side of agriculture such as designing farming implements, promoting good scientific farming practices, research, and helping agricultural engineers in such fields as crop spraying and harvesting equipment
- **Other** – agricultural engineer*; agricultural engineering technologist or technician; agricultural researcher; botanist*; farmer; nature conservationist; poultry scientist; veterinary technologist; soil scientist*; viticulturist; agricultural extension officer.

What will I do in this career?

- Manage water resources by planning, supervising, and building systems to control irrigation, drainage, floods, and water resources

- Design and manufacture agricultural machinery, equipment, and instruments
- Plan and construct agricultural buildings, such as greenhouses, nurseries, fish hatcheries, housing for animals, grain silos and dryers
- Carry out environmental impact assessments
- Research the work done on farms, research stations, and forests
- Analyse and develop methods for soil conservation
- Control water logging and soil salinity
- Supervise the preparation of soil, seeding, harvesting, spraying, processing, packaging, and transporting agricultural products.

Qualifications and training

(See also qualifications under Agriculture). These include:

University degrees

- BEng: Agricultural Engineering
- BSc: Agriculture; Engineering
- BSc: Agriculture: Environmental Microbiology
- BTech: Engineering

National certificates and national diplomas

- National Certificate: Water and Wastewater Treatment Practice
- National Certificate: Engineering Studies
- Advanced Diploma: Sustainable Agriculture in Rural Development

Learnerships

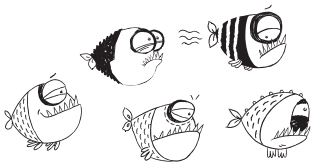
- AgriSETA offers a large number of learnerships.

Who will employ me?

DWA; forestry industry; Agricultural Research Council.

Where can I find out more?

SA Institute of Agricultural Engineers; Institute of Professional Engineering Technologists; Manufacturing, Engineering and related Service Education and Training Authority (MERSETA); AgriSETA.



Aquaculturist

Aquaculture, also called aquafarming, is the cultivation of marine or freshwater plants and animals, including fish, shellfish, water-blommetjies, crustaceans, and even crocodiles. These creatures are harvested for food, pets, aquariums, and for restocking wild populations. Aquaculturists usually work as farmers or technicians.

They work mostly outdoors, and their work often means that they get wet or dirty. Most aquaculturists are expected to work overtime, particularly in the harvesting months. Like farming, stock needs to be cared for all the time, even over weekends and public holidays.

What will I do in this career?

- Plan and manage the operation of hatcheries
- Check and maintain water quality using oxygen meters, salinity meters, pH (acidity) meters, thermometers, and water chemistry analysis kits
- Care for stock
- Identify and control poisons and diseases
- Assist with experiments on nutrition or methods to control predators, parasites, and other disease causing organisms
- Buy, sell, and transport fish and other aquatic stock
- Keep records of farming activities.

Qualifications and training

These include:

University degrees

- BSc: Aquatic Science; Ichthyology; Zoology; Aquaculture; Hydro Science; Hydrobiology; Hydrobiology and Physiology; Hydrology; Water Resource Management

- BEarth Sciences: Hydrology and Water Resources
- BTech: Water Care

National certificates and national diplomas

- National Certificate: Water and Waste-water Treatment Practice; Biotechnology; Water Care
- National Diploma: Fisheries Resource Management; Water Care
- National Higher Certificate: Water Care
- FET Certificate: Fisheries Resource Compliance
- National Certificate: Conservation: Fisheries Resource Management; Fisheries Observation: Inshore; Fishing Operations; Hydrographic Surveying

Learnerships

- On-the-job training

Who will employ me?

Private farms, government fish hatcheries, experimental aquatic farms, food industry.

Where can I find out more?

Agricultural Research Council; nature conservation departments; AgriSETA.

Aquatic Scientist

As an aquatic scientist, you will study various aspects of inland and marine water environments. This would include the physical where you would study temperatures, water currents and rates at which water flows, water clarity, erosion and sedimentation occur. The biological aspect covers such areas as plants, animals, and microbes that live in water. The chemical aspect looks at the organic and inorganic composition of water, water cleansing (sewage disposal), the availability of nutrients, and water quality. The ecological side is the study of limnology, which researches the ways in which organisms interact with their environments, how all these are affected by pollution, and their distribution patterns, conservation, and whatever affects the way food is produced and used.

In this career, you could also be involved in managing water resources, such as water storage and supply and the allocation of water for use in agriculture, in people's homes, and in industries.

Here are some other similar occupations and specialisations that may interest you:

- **Water utilisation engineer** – an agricultural engineering is involved with hydrology and water works, water delivery and conveyance systems, irrigation system design, irrigation system management, drainage of irrigated lands, aquaculture system

design, as well as water supply and irrigation.

- **Water and wastewater treatment** – are responsible for purifying wastewater by removing solid wastes, toxic chemicals and harmful organisms. The size of the wastewater treatment plant determines the duties of wastewater technicians. Job functions include performing pump inspections, compliance inspections and maintaining the buildings and grounds. Other duties include completing work order reports, collecting water samples for chemical testing, and testing flow rates.

You may be interested in these related careers: aquaculturist*; biologist*; ecologist*; zoologist*; microbiologist*; aquatic science technician (assists scientists and researchers in laboratory and fieldwork); aquatic science researcher; hydrologist*; marine biologist*; limnologist (studies inland freshwater systems, such as rivers, dams, wetlands, and estuaries; the interactions between these environments and the organisms that live in them; and the effect of pollution and the over-exploitation of these resources).

What will I do in this career?

- Monitor and collect water samples to determine water quality, organisms, levels of silt, and pollution
- Record data and perform experiments in the field or in a laboratory

- Analyse samples in a laboratory and/or using computers and write up the results
- Develop methods for cleaning water of sewage and pollutants
- Manage and allocate water resources
- Develop plans to make sure that an aquatic ecosystem stays healthy
- Carry out environmental impact assessments
- Develop ways to purify water
- Find ways to reuse waste materials
- Do research on new products
- Develop antibiotics and test the reactions of the human body to medicines
- Manufacture products through chemical processes and reactions (biotechnology)
- Prepare or supervise scientific reports based on observations and experiments.

Qualifications and training

(See also qualifications under Aquaculture). These include:

University degrees

- BSc: Aquatic Science; Natural Sciences; Biochemistry; Chemistry; Environmental Chemistry; Plant Biochemistry; Pure and Applied Chemistry
- BEarth Sciences: Hydrology and Water Resources
- BTech: Hydrology; Water Care; Analytical Chemistry; Chemistry
- BSc(Hons): Limnology and Ecology

National certificates and national diplomas

- National Diploma: Analytical Chemistry
- National Certificate: Analytical Chemistry

Who will employ me?

Universities, research institutes (such as Institute for Water Research; Institute of Natural Resources); local municipalities; science councils (e.g. CSIR); government departments (e.g. DWA, Department of Environmental Affairs) provincial departments for nature conservation; and water utilities.

Where can I find out more?

Universities; Southern African Society of Aquatic Scientists; Local Government, Water, and related Services Sector Education and Training Authority (LGWSETA); Suid-Afrikaanse Instituut vir Landbou Ingenieurs; and AgriSETA.

Biochemist

Biochemistry is the basis of all the life sciences. As a biochemist, you study the cells of living organisms such as animals, plants, and micro-organisms, their chemical composition and their metabolic processes.

You apply your knowledge in fields such as medicine, veterinary science, agriculture, forestry, horticulture, environmental science, and manufacturing. You may also be involved in genetics or forensic science. You would spend most of your time working indoors in laboratories.

Other life science careers that may interest you include those of: biotechnologist (i.e. a biochemist that develops methods to control biological processes in manufacturing food, drugs, or other products and waste clean-up), clinical biochemist (i.e. a specialist biochemist who works in hospital laboratories, studying the chemistry of body tissues and fluids to help diagnose and treat diseases), biologist*, botanist*, chemist*, entomologist, horticulturist, microbiologist*, pharmacist, zoologist*, and work in agriculture*.

The various BSc degrees are divided into three broad areas: physical, mathematical and biological sciences. Each has further sub-divisions, such as physics, chemistry, botany and microbiology. The first year builds basic scientific knowledge and skills in the broad field of your choice. Computer literacy and scientific communication are usually obligatory.

What will I do in this career?

- Carry out detailed chemical analysis using sophisticated instruments and techniques
- Observe, research, analyse, and interpret results
- Study the processes, such as digestion and growth, of organisms time is divided between being in a laboratory and being out in the water environment carrying out research and monitoring.

Qualifications and training

These include:

University degrees

- BSc: Plant Biochemistry
- BSc: Agriculture: Biochemistry; Environmental Microbiology
- BSc: Biology Earth and Environment Science; Hydrobiology; Hydrobiology and Physiology; Plant Biochemistry
- BTech: Biotechnology

National certificates and national diplomas

- National Certificate: Biotechnology
- Specialist Certificate: Biology
- Specialist Diploma: Biology

Note: *Postgraduate study, up to doctoral level, is needed for high-level research and for many management and administrative positions.*

Who will employ me?
Science councils; hospitals or government departments (e.g. departments of health and agriculture); SABS; SA Medical Research Council; industries that manufacture food, beverages, drugs, or insecticides; municipalities; water utilities, universities.

Where can I find out more?
Chemical and Allied Industries Association; Chemical Industries Education and Training Authority (CHIETA), Institute of Waste Management Southern Africa; Water Institute of Southern Africa.

Biologist

In general, biologists study living organisms (i.e. their structure, functions, evolution, distribution, and the way they relate to each another). As a biologist, you research the life cycles of living organisms such as humans, animals, and plants and how these cycles relate to their environments. In the water field, your work includes studying natural systems and how they are affected by human activities.

You could specialise in biochemistry, microbiology, genetics, botany, zoology, medicine, agriculture or biotechnology.

Where you work will depend on your specialisation. Some biologists work mainly in laboratories or offices; others work mostly outdoors doing field research (e.g. collecting water samples) and spend much time away from home.

If you are interested in biology, you could also consider the careers of: biological technologist, microbiologist*, biochemist*, botanist*, aquatic scientist*, physiologist, zoologist*, and ecologist*.

Some biology specialisations (each includes both research and implementation):

- **Biotechnologists** – apply techniques of using living organisms, such as bacteria, to perform chemical processes (e.g. in the wastewater treatment industry), to make products such as animal feed, or to modify micro-organisms, plants, and animals. You could be involved in a wide range of activities, from pure research to industrial applications
- **Geneticists** – study ways in which biological characteristics, such as colour, size, or disease resistance, pass from one generation to the next; work out what the environment contributes to the origin, transmission, and development of inherited characteristics; and, perhaps, alter or produce new characteristics in a species. You could be a molecular, human, animal, or plant geneticist
- **Limnologists** – the study of inland waters, including aspects such as ecosystem health and the sustainable exploitation of resources
- **Marine biologists** – study the biology of life in the sea, such as salt-water fish and algae

- **Molecular and cell biologists** – examine the processes of life (e.g. where organisms synthesise essential chemicals from food, store and generate energy, or pass on characteristics genetically). In this career you can work in research institutions or in the medical, agricultural, or food industries, for example
- **Pathologists and parasitologists** – are biologists who study the causes, effects, and treatment of diseases
- **Biological technicians** – collect and analyse samples (e.g. water, seeds, food, drugs); operate and maintain laboratory and field equipment (e.g. microscopes, sample kits); depending on the area of work, you may: e.g. grow cultures under controlled conditions; identify and compare materials like blood, body fluids, and hair to catch criminals (for forensic purposes).

What will I do in this career?

- Study organisms in their environment
- Study the genetic, chemical, physical, and structural composition of cells, tissues, and organisms
- Identify and classify species or specimens
- Find out how internal and external environments influence life processes in animals (including humans), plants, and other organisms
- Study organisms in controlled environments to understand how they survive and grow in real environments
- Study, predict, and learn to manage the effects of humans and other influences on natural ecosystems (e.g. the effect of a sewage plant that opens close to a natural river)
- Advise and report on your research to scientists, managers, politicians, health care workers, and the general public
- Supervise biological technologists, technicians, and other scientists.

Qualifications and training

(See also Biochemist on page 40)

These include:

University degrees

- BSc: Plant Biochemistry
- BSc: Agriculture: Biochemistry; Environmental Microbiology; Natural Sciences; Biological Sciences; Life Sciences; Molecular and Cellular Biology
- BSc: Biology Earth and Environment Science; Hydrobiology; Hydrobiology and Physiology; Plant Biochemistry
- BTech: Biotechnology

National certificates and national diplomas

- National Diploma: Horticulture; Nature Conservation
- National Certificate: Biotechnology
- Specialist Certificate: Biology
- Specialist Diploma: Biology

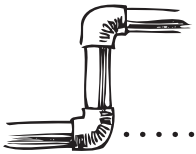
Who will employ me?

Research institutions and higher education institutions; government departments; science councils; water utilities; research and development divisions of large corporations; Oceanographic Research Institute.

Where can I find out more?

Southern African Institute for Ecologists and Environmental Scientists; Zoological Society of Southern Africa; Southern African Society of Aquatic Scientists; South African Council for Natural Scientific Professions; Health and Welfare SETA (HWSETA).

Boilermaker



A boilermaker cuts, shapes, and assembles metal sheets to make containers that have to withstand pressure, such as boilers for steam engines, pressure vessels for power stations, and storage tanks.

In this career, you could also be involved in constructing and repairing towers, bridges, girders, and ships. With similar qualifications, you can also follow the careers of fitter and turner*, sheet metal worker, and welder*.

What will I do in this career?

- Draw plans for containers and make calculations about what materials (e.g. steel plates and pipes) and equipment will be needed
- Cut, roll, bend, mould, hammer, and shape metal sections and pipes, using hand and machine tools, welding equipment, and computers
- Assemble the parts by welding, riveting, and bolting them together
- Fit pressure gauges, valves, and other parts
- Finish, clean, polish, file, or bath the products in acid solutions and paint them
- Maintain, repair, clean, and inspect containers and structures.

Qualifications and training

These include:

Learnerships

- Practical training – apprenticeship with an employer that offers in-service training under a qualified tradesman or artisan
- Theoretical training – qualification at a FET college or through a correspondence course
- Compulsory trade test – to qualify as an artisan (set by the Department of Labour).

Note: *To become a boilermaker, you should be at least 16 years old and have a grade 9 certificate.*

Who will employ me?

Engineering factories, railways, shipyards, mines, Sasol, construction companies, iron and steel plants, power plants, petroleum refineries, water treatment plants, self-employment.

Where can I find out more?

Manufacturing, Engineering and related Service Education and Training Authority (MERSETA); Construction Education and Training Authority (CETA); Steel and Engineering Industries Federation of Southern Africa (SEIFSA).

Botanist

Botanists study the biology and ecology of all plants. As a botanist, you could use your knowledge in areas such as conservation, management of natural resources, agriculture, forestry, horticulture, medicine, and biotechnology. You may work in laboratories and conduct research outdoors. Fieldwork involves collecting and documenting plant species and numbers of plants in particular areas, so that, for example, the natural environment can be rehabilitated after mining operations.

As a botanist, you may wish to specialise:

- **Plant taxonomists** – identify and classify plants, and study plant systematics, chemistry, structure, genetics, and reproduction
- **Ethnobotanists** – study the traditional uses of plants for food and medicine
- **Palynologists** – study pollen grains and plant spores found in geological and archaeological deposits, and often shed light on the history of a region
- **Palaeobotanists** – study plant fossils
- **Plant physiologists** – study the ways that plants function (i.e. their growth, development, nutrient intake, and biochemical processes)
- **Mycologists** – study fungi
- **Plant pathologists** – study diseases in plants

- **Plant geneticists** – deal mainly with crop cultivation and population or with evolutionary genetics
- **Weed scientists** – study different types of weed and implement the mechanical, chemical, and biological ways to control them.

If you are interested in botany, you may also consider the following careers: agricultural scientist; aquatic scientist*, biologist*, ecologist*, zoologist*, microbiologist*, botanist*, food scientist; forester; groundskeeper; horticulturist; nature conservationist; parasitologist; silviculturist; tree surgeon.

What will I do in this career?

- Investigate the effects of environmental quality (e.g. rainfall, temperature, sunlight, flow, water quality, disease) on plant growth, specifically aquatic weeds
- Grow plants under controlled conditions to find out how different environmental factors affect them
- Study plant chromosomes, cells, and tissues
- Prepare scientific articles/reports, handbooks for plant identification, etc.
- Supervise and coordinate the work of technical support staff
- Collaborate with other scientists to develop products from plants (e.g. drugs, medicines)
- Identify plant specimens
- Use computers for storing and analysing data
- Give advice about managing the environment and the conservation of wild plants used by people.

Qualifications and training

These include:

University degrees

- BA: Environmental Management
- BSc: Natural Sciences; Biological and Life Sciences; Applied Environmental Sciences; Biology Earth and Environment Science; Plant Biochemistry; Plant Ecology
- BEnvironmental Sciences: Ecology and Resource Management
- BTech: Environmental Management; Forestry; Horticulture; Turfgrass Management

National certificates and national diplomas

- National Diploma: Horticulture; Nature Conservation; Forestry; Turfgrass Management
- National Certificate: Horticulture; Forestry; Nature Conservation; Turfgrass Management; Conservation: Natural Resource Management: Terrestrial; Nature Conservation: Resource Guardianship
- Diploma: Forestry; Natural Resource Management; Nature Conservation; Nature Management; Rural Resource Management
- Certificate: Forestry; Environmental Management; Post Mining Rehabilitation
- Advanced Diploma: Sustainable Agriculture in Rural Development
- National Higher Certificate: Environmental Management; Forestry; Nature Conservation; Turfgrass Management
- FET Certificate: Environmental Practice; General Forestry; Nature Conservation: Natural Resource Guardianship: Terrestrial; Horticulture

Graduate development programmes

- BA(Hons): Land Reform and Rural Development
- Advanced Postgraduate Certificate: Environment and Development
- Advanced Postgraduate Diploma: Environment and Development
- Advanced Postgraduate Diploma: Protected-Area Management
- Postgraduate Diploma: Environmental Health; Nature Conservation; Science

Note: *With an NDip you would not work as a professional botanist, but you would work together with professional botanists in a large number of careers.*

Who will employ me?

Higher education institutions; schools; departments of agriculture; water affairs and enviromental affairs; science councils; Plant Protection Research Institute; conservation agencies; industry (e.g. breweries); consulting (e.g. to fertilizer companies, government); botanical gardens.

Where can I find out more?

Southern African Institute for Ecologists and Environmental Scientists; AgriSETA; SETA for Secondary Agriculture (SETASA); Botanical Society of South Africa; Southern African Society of Aquatic Scientists.

Cartographer

Cartography is the science of making maps as well as their study as scientific documents and works of art. In particular, it concerns all stages of evaluation, compilation, design and graphic representation required to produce new or revised maps from different forms of basic data, such as aerial photographs, field records, historical manuscripts, other maps, and statistical reports. Map projections are used to translate the curved surface of the earth onto a flat sheet of paper.

The introduction of GIS (geographic information systems) and other computer assisted mapping systems; wireless applications and GPS (global positioning systems) have added new dimensions to cartographic techniques and the use of digital spatial information. Conventional map production techniques, such as draughting, scribing, colour separation, type layout and reprographic, and printing have given way to computer technology. Cartographers must communicate information about the earth in an easily understandable form that is scientifically accurate and aesthetically pleasing. They work closely with surveyors*, geologists*, GIS specialists, and other professionals involved in planning and development related to spatial information.

The types of maps produced depend on the employer and the purpose for which the map is required. Thematic maps, such as geological and meteorological maps, are produced within specific organizations and represent data relating to specific themes (geology, weather). Maps produced by the DWA will relate mainly to the management of South Africa's water and forestry resources.

As a cartographer you can also train in surveying and photogrammetry (the science of compiling maps and plans from aerial photographs or satellite images). Although cartography is regarded as a specialist field in itself, you can consider specific types of mapping such as geological mapping or remote sensing (mapping involving satellite and other remotely sensed imagery).

Some related occupations are: GIS, information technology*, surveying*, land surveying, and photogrammetry.

What will I do in this career?

- Collect, digitally capture, and edit information from various sources to produce maps
- Select, classify, simplify, and symbolise complex data to fulfil scale and functional requirements
- Analyse, process, interpret, and manipulate data to facilitate spatially related management decisions
- Apply specialised computer assisted mapping and GIS software to process information and compile maps

- Set technical specifications, especially for thematic map series, so that all maps in the series are produced according to the same specifications
- Set mapping standards, such as symbol sets, to ensure standardised map production
- Develop procedures to streamline workflow and facilitate the optimal use of available resources
- Research matters related to the effective advancement of technology and its application to the field
- Counsel and advise clients, users, and managers to provide the best mapping solution for a specific theme or problem.

Qualifications and training

These include:

University degrees

- BSc: Land Surveying
- BTech: Surveying and Cartography; Cartography; Surveying; Chemical Engineering; Engineering; Quality Assurance
- BGeographical Information Science (GISc)

National certificates and national diplomas

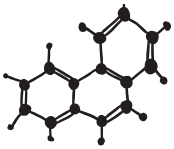
- National Diploma: Surveying and Cartography; Engineering; Chemical Engineering; Cartography; Hydrographic Surveying
- Certificate: Cartography
- National Certificate: Cartography
- National Higher Certificate: Cartography

Who will employ me?

DWA; other government departments; Chief Directorate: Surveys and Mapping, Department of Land Affairs; Council for Geoscience; CSIR; Telkom; municipalities; provincial planning departments; and organisations/companies involved in GIS or spatial management of assets/resources.

Where can I find out more?

DWA; Chief Directorate: Surveys and Mapping.



Chemical Engineer

If you work in chemical engineering, you will design and operate processes that turn raw materials (through physical, chemical, and thermal changes) into useful everyday products such as petrol, pharmaceuticals, toothpaste, sugar, plastics, synthetic fibres, chemicals, explosives, paper, fertilizers, and cement. You could also protect the environment by controlling the pollution of water and air.

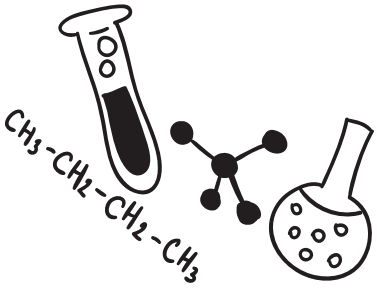
Chemical engineers work mostly indoors in engineering design offices, research institutions, laboratories, and processing plants. Chemical **technicians** act as a link between chemical engineers and plant operators, solving technical problems and testing engineers' theories. They work in production plants, laboratories, and offices. Chemical **technologists** spend most of their workday in the production area of a factory, operating and maintaining chemical production processes. If you follow any of these careers in a continuous process plant, you may be on call 24 hours a day; you may work shifts when new plants are commissioned.

Here are some other similar occupations and specialisations that may interest you:

- **Process design engineer** – designs chemical and waste treatment plants to make them work efficiently
- **Process control engineer** – specialises in the control systems, instruments, computer applications, and measurement techniques that are used to operate a plant smoothly, safely, and efficiently
- **Biochemical engineer** – uses chemistry, biology, and processing techniques to improve the workings of processes that use living organisms in producing beer or pharmaceuticals, for instance, and in treating effluent
- **Petrochemical engineer** – converts oil and gas into plastics, synthetic rubber, and other similar products
- **Other** – agricultural engineer*, biomedical engineer, ceramics technologist, metallurgical engineer, petroleum engineer, environment engineer*, and quality assurance technologist.

What will I do in this career?

- Test and fix equipment used in chemical procedures
- Analyse chemicals to produce new products
- Design and operate processes that treat water and effluent
- Research and develop new chemical processes



- Design plant and equipment, such as reactors, heating and cooling systems, filters, and pipelines
- Analyse possible safety hazards
- Test and commission plants
- Build and test experimental or pilot plants
- Solve technical problems
- Perform calculations and write reports
- Analyse samples and take measurements
- In more senior positions, manage people
- See if the methods you use for making products work well and are cost efficient and environmentally friendly.

Qualifications and training

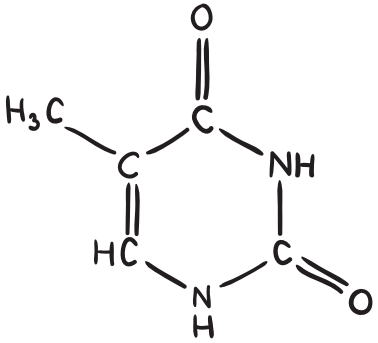
These include:

University degrees

- BEng: Chemical Engineering
- BSc (Eng): Chemical; Chemical Engineering; Chemical: Mineral Processing; Chemical Engineering
- BEarth Sciences: Hydrology and Water Resources
- BSc: Community Water Services and Sanitation; Water Resource Management
- BTech: Water Care

National certificates and national diplomas

- National Higher Diploma: Chemical Engineering
- National Certificate: Wastewater Process Control; Water and Waste-Water Treatment Practice; Water Care; Community Water, Health and Sanitation Monitoring; Water Purification Process Operations
- National Diploma: Water Care



- National Higher Certificate: Water Care
- General Education and Training Certificate: Water Services
- FET Certificate: Community Water, Health and Sanitation Facilitation
- General Education and Training Certificate: Water Services

Who will employ me?

Water processing and effluent treatment industries; Eskom; Sasol; municipalities; water authorities; chemical manufacturing companies; chemical equipment manufacturers and suppliers; food and beverage, textile, fertilizer, explosives, coal and gas, and metallurgical industries; pharmaceutical companies; crude oil refineries; Mintek; NECSA; government departments; paper and pulp manufacturers; universities.

Where can I find out more?

Society for Professional Engineers (SPE); Engineering Council of SA (ECSA); Institute of Professional Engineering Technologists; Chemical Industries Education and Training Authority (CHIETA).

Chemist

A chemist studies and applies the chemistry and physics of substances to find out what they are, to develop new substances and processes, and to increase scientific knowledge. As a chemist, you can work in research and development as well as production and inspection. You would spend most of your working days indoors in an office, factory, or laboratory, but you may spend time outdoors monitoring and collecting samples. If you are interested in chemistry, you might also be interested in, for example, the careers of agricultural scientist*, biologist*, chemical engineer*, geologist*, pharmacist, physicist, or laboratory worker*.

Some of the areas in which you can specialise as a chemist include:

- **Analytical chemist** – carries out tests and analyses the composition, structure and characteristics of substances and materials and the changes they undergo. In this career, you find out what substances are present and in what quantities. You identify pollutants in soil, water, and air
- **Aquatic chemist** – is interested in organic, inorganic, and trace metals found in water and sediments, and in the way that living organisms transform chemicals. Aquatic or water chemists often work in teams that include scientists who specialise in soil, geology, biology, statistics, hydrogeology, and mathematical modelling. The teams monitor and study ecosystems and industrial processes to discover how these affect water quality and each other. Many teams are studying how global warming might affect the carbon and water cycles
- **Geochemist** – studies the chemistry of earth materials such as rocks and soil
- **Research chemist** – finds solutions to chemical problems through research and application. In this work you use your knowledge and research findings to help create and improve products.

What will I do in this career?

- Conduct experiments to identify chemical compositions and study the

chemical changes that occur in natural and processed substances
- Research, analyse and develop theories, techniques, and processes
- Apply experiment and research findings to create new compounds and processes for industrial, agricultural, and medical use, for example
- Test products and materials to make sure that they comply with quality standards and government health and environmental laws
- Supervise and coordinate the work of technical support staff.

Qualifications and training

These include:

University degrees
- BTech: Chemistry; Analytical Chemistry
- BSc: Natural Sciences; Chemistry; Physical Sciences: Environmental Chemistry; Plant Biochemistry; Pure and Applied Chemistry; Applied Earth Sciences; Bio-Organic Chemistry; hydrogeology
- MTech: Chemistry; Analytical Chemistry
- BSc(Hons): Chemistry, Bio-Organic Chemistry, Applied Chemistry

National certificates and national diplomas
- National Certificate: Analytical Chemistry, Chemistry
- National Higher Certificate: Analytical Chemistry, Chemistry
- National Diploma: Analytical Chemistry, Chemistry

Note: *You would need an MSc or PhD for higher positions in lecturing, research, and administration.*

Who will employ me?

Water treatment plants, chemical and other manufacturing industries, research institutes, SABS, CSIR, government departments, National Energy Commission of South Africa, educational institutions, chemical laboratories, environmental management companies, water utilities.

Where can I find out more?

Chemical and Allied Industries Association; Chemical Industries Education and Training Authority (CHIETA).

Civil Engineer

Civil engineering is probably the broadest of the engineering fields. Civil engineers create, improve, and provide facilities for living, industry, and transportation. As a civil engineer in the world of water, you could work on water supply systems, dams, irrigation, water purification plants, storm water systems, flood control structures, sewerage systems, sewage works, harbours, docks, tunnels, and canals. In a civil engineering career you need to know about construction materials, soils, hydraulics, and fluid mechanics. You will also be concerned with protecting and conserving the environment.

Civil engineers are helped by civil engineering technicians, who do much of the practical and functional work, and civil engineering technologists, who do the more theoretical work such as planning, design, or research. You may work in offices but spend much of your time on site. If you work on new major engineering sites you may have to move home every so often.

If you are interested in civil engineering, you could also consider the careers of, for example, town and regional planner*, aeronautical engineer, agricultural engineer*, quantity surveyor, mechanical engineer*, land surveyor*, and architect.

What will I do in this career?

Specific tasks and responsibilities of civil engineers, technicians, and technologists depend on what area of specialisation you

choose. In general, civil engineering is divided into two types of activity:

- Planning and design – surveying; costing; estimating; draughting; computer analyses; generating computer-aided designs; investigation and testing materials; investigating sites; analysing risks associated with natural disasters such as wind, earthquakes, fires, and floods; helping government bodies to prepare public works programmes with set budgets, e.g. building airports, drainage, roads, and sewerage systems
- Construction and maintenance – day-to-day planning, controlling, inspecting, managing, coordinating, and supervising civil engineering works; organising the delivery of materials, plant, and equipment that are needed for construction.

Hydraulics/water resources engineer

- Designs, builds, monitors, and advises on how to operate, maintain, and repair water resource facilities such as dams, reservoirs, hydroelectric plants, water supply systems, drainage systems, sewerage systems, how to design harbours, and how to control rivers
- Measures water flow in streams and canals, through channels and conduits, and in underground aquifers
- Gathers and analyses data on the size and frequency of stream flows and the frequency and extent of floods
- Studies the behaviour of water in natural systems such as rivers, wetlands, and groundwater aquifers so as to manage the environment better
- Manages catchment areas to ensure that all the activities within them that depend on or have an effect on the water resource are carried out in an integrated and sustainable way.

Irrigation/drainage engineer

- Determines the characteristics of soil, e.g. type, salinity, surface profile, below-normal plant growth, and water table level
- Calculates rates of water flow
- Draws plans that show channels, conduits, and ditches
- Constructs laboratory models to study construction and flow problems.

Municipal engineer

- Develops cities and towns
- Plans, designs, constructs, and maintains all water, sewerage, roads, and storm water infrastructure of homes, businesses, and industries
- Manages cleansing services and refuse disposal sites.

Geotechnical/soil/geological engineer

- Inspects, drills, and samples proposed construction sites to find out about soil, rocks, groundwater and other foundation conditions
- Carries out field and laboratory tests on soils and reports on them

- Makes recommendations for engineering solutions to problems
- Ensures that large structures, such as high buildings, dams, roads, or new townships, are designed correctly according to the soil conditions or the rock strength
- Specifies the mixture of soil to use on roads and other constructions
- Calculates and advises on the slope and thickness of soil dams and retaining walls
- Constructs and maintains tunnels, dams, and building foundations
- Designs measures to correct land contamination and salination
- Works out strategies to control landslides and areas of instability
- Designs mines and the rehabilitation work to be done once mining is finished
- Designs structures in rock such as tunnels, basements, and shafts.

Water systems/pipeline engineer

- Plans, designs, constructs, and manages systems to supply clean drinking water
- Determines where a need for water exists and designs reliable pipe, pump, and reservoir systems to satisfy that need
- Designs pipelines and pipeline equipment, facilities, and structures in consultation with petroleum and mechanical engineers
- Maps and surveys sites to work out the best way to lay out the pipelines
- Analyses operations and maintenance costs
- Advises on the operation of machinery and equipment used to transport petroleum products through the pipeline system.

Waste and wastewater treatment engineer

- Designs treatment plants and works
- Plans and designs waste and wastewater treatment process.

Structural engineer

- Designs the framework of e.g. water treatment structures, tunnels, power plants, towers, and bridges
- Studies the development of new materials and methods for design and construction
- Erects reinforced concrete, structural steel, timber, and masonry structures.

Qualifications and training

These include:

University degrees

- BEngSc
- BSc(Eng): Civil Engineering
- BTech(Eng): Civil Engineering; Civil: Environmental; Materials; Engineering Technology

National certificates and national diplomas

- National Diploma: Engineering; Civil Engineering; Materials
- National Certificate: Engineering Studies; Certificated Engineering
- Advanced Postgraduate Certificate: Engineering
- Advanced Postgraduate Diploma: Engineering
- National Higher Certificate: Engineering
- Postgraduate Diploma: Engineering

Who will employ me?

Engineering, construction, and architectural firms; government departments (e.g. DWA); municipalities; Sasol; Eskom; CSIR; universities; provincial administrations; SABS.

Where can I find out more?

South African Society for Professional Engineers; Engineering Council of South Africa (ECSA); South African Institute of Civil Engineering; Institute of Professional Engineering Technologists; South African Association of Consulting Engineers; South African National Council of Tunnelling; Institute of Municipal Engineering of Southern Africa; South African Federation of Civil Engineering Contractors; Construction Education and Training Authority (CETA); Local Government, Water and related Services SETA (LGWSETA).

Climatologist/Meteorologist

Climatology is the study of climate (weather conditions) averaged over a period of time. Climatology is used for short-term weather forecasting and climate models are used for a variety of purposes from the study of weather dynamics and climate systems to projections of future climate.

Meteorologists study the earth's atmosphere and the changes in it that affect day-to-day weather, long-term climate, and extreme weather conditions such as hurricanes and tornadoes. You forecast the weather by examining trends in the atmosphere such as wind currents, precipitation, and air pressure.

Meteorology, climatology, atmospheric physics, and atmospheric chemistry are sub-disciplines of the atmospheric sciences and is often a subfield of physical geography or as a study field of its own as geoinformatics and meteorology. Climatology and meteorology also has ties with allied disciplines in the broad fields of earth sciences, urban studies, social sciences, and environmental sciences. Meteorology and hydrology comprise the field of hydrometeorology. Climatologists also study aspects of oceanography and biogeochemistry.

As a meteorological technician, you would be responsible for collecting meteorological information and for operating and maintaining weather observation networks. Technicians provide almost all the services of the South African Weather Bureau. Meteorologists and technicians normally work in shifts and may be based at remote field stations. They often work at night and during weekends because weather information is needed 24 hours a day.

If you are interested in a career in meteorology, you may also be interested in the careers of astronomer, electronics engineering technician, geographer*, meteorological instrument technician, oceanographer, climatologist, and weather broadcaster.

What will I do in this career?

- Analyse and interpret satellite cloud images, remote sensing data, and other information about atmospheric conditions

- Develop and use scientific techniques to forecast and interpret climatic conditions
- Prepare weather forecasts, including special forecasts for airports, agriculture, fishing, and shipping
- Organise, update, and apply information from satellite, radar, and powerful computers
- Install and maintain the apparatus used to gather meteorological information
- Supply weather forecasts via radio, television, and newspapers
- Conduct meteorological research to control air pollution
- Keep records of weather observations
- Predict rainfall and runoff.

Climatologists/Meteorologists can specialise in the following fields:

Broadcast Meteorologists – who interpret and report the weather for the media. They use real-time satellite imagery, radar images, analysed weather charts, computer generated model fields and numerical weather products to issue forecasts.

Specialised Forecasters – interpret the weather for aviation, marine forecasting for, forestry (fire warnings), farming and whenever extreme weather conditions are expected.

Research Meteorologists – work mainly for the weather service, CSIR or other government agencies. There are rapid technological developments, increasingly sophisticated equipment such as meteorological satellites, automatic weather stations and powerful electronic data processing systems used to capture and process meteorological data. In conjunction with the Water Research Commission, for example, the Weather Bureau has done research on the microphysics of clouds, the artificial stimulation of rainfall and hail suppression.

Educationists – who educate the next generation in the field of meteorology.

Forensic Meteorologists – are often called upon to investigate claims for insurance companies on past weather or research weather

Consulting Meteorologists – work for large corporations/organisations as consultants

Climate Meteorologists/Climatologists – interpret long-term weather patterns and provide data to help predict future climate trends and past climate data. They disseminate, analyse and undertake research on large volumes of climate data and records, which they analyse to produce climatological publications and information.

Climate Change Scientist – This is a new and growing research field. Climate change impacts on food security as illustrated in the report from the Commission on Sustainable Agriculture and Climate Change. The Water Governance group has also recently completed a comprehensive literature review of research on South Africa's legislative water institutions. The CSIR has also made detailed projections of future climate variability and change over Africa. Further information is available in the National Climate Change Response White Paper of October 2011.

Air Quality Specialists – deal with many aspects relating to air quality, in particular the measurement, analysis and archiving of ambient air quality; the development of

atmospheric and greenhouse gas emission inventories; and air quality modelling and forecasting.

Archive Meteorologists – are in charge of researching, verifying, and reporting on past storms. They also work with climate change and air quality specialists to archive, analyse and disseminate air quality data. They need to understand the chemical and meteorological processes that affect the quality of the air, the effects of atmospheric pollutants on environmental quality and human health.

Meteorological Technicians – are responsible for the collection of meteorological information. Their work includes the rendering of meteorological advisory services, the operation and maintenance of a weather observation network, and research and training. They are responsible for the installation, maintenance and development of electronic and sophisticated equipment such as electronic airport systems and weather radar.

Qualifications and training

These include:

University degrees

- BEarth Sciences: Geologic: Hydrologic and Meteorologic Studies
- BSc: Meteorology; Applied Environmental Sciences; Earth and Atmospheric Sciences; Geographical Sciences; Applied Mathematics; Physical Science and Mathematics
- BA: Environmental Studies; Geography
- BEnvironSc: Geography
- BGeogInformation Science (GISc)

- BSc: Chemical Engineering
- BTech: Electrical Engineering: Light Current
- BSc(Hons) Meteorology or Atmospheric Sciences
- BA(Hons): Geography: Environmental Studies

National certificates and national diplomas

- Certificate: Environmental Management; Geographical Science; Advance Mathematics
- Diploma: Geographical Science
- Specialist Certificate: Mathematics
- Specialist Diploma: Mathematics
- National Certificate: Environmental Management
- National Diploma: Environmental Management
- Postgraduate Diploma: Geographical Science; mathematical Sciences

Learnerships

The South African Weather Service offers a 10 month Weather Observer course to successful applicants. The course includes aspects such as surface and upper-air observations, maintenance of meteorological instruments, automatic weather stations, climatic data and inspections of climatic stations. As computer literacy is essential in this field of work, training is also given in the use of PC-based applications. This is a numbers limited course.

Note: *Climatology candidates must undergo practical training under the supervision of a senior officer at the Weather Bureau. Training consists of weather observation, operating meteorological instruments and weather forecasting. To become a forecaster, the certificate for forecasting needs to be completed after the honours degree.*
A meteorologist must undergo practical training (on weather observation, operating meteorological instruments, and weather forecasting) under the supervision of senior officers at the Weather Bureau. To become a professional meteorologist, you need a course in statistics.

Who will employ me?

Meteorology has application in many diverse fields such as the military, energy production, transport, agriculture and construction. Other employers are the South African Weather Service; South African Civil Aviation Authority; Department of Environmental Affairs; Department of Agriculture; CSIR; universities; forecast offices of airports and air force stations.

Where can I find out more?

South African Weather Services; CSIR; the Global Atmosphere Watch; air quality consulting firms; universities; DEA; Institute for Soil, Climate, and Water (ARC-ISCW); Society of South African Geographers.

Community Worker

Community workers encourage and help groups to help themselves and to develop, that is, they help communities to identify their own needs, to take decisions, and to develop ways in which to meet those needs. Community workers travel within their communities and keep in close personal contact with them.

No matter what educational background you may have, there are many kinds of work in this sphere for those who care about others and want to make a difference.

There are opportunities in the fields of social welfare, social security and community development. Some community workers are selected and trained as part of a national programme of the Department of Public Service and Administration. They work for the local authorities in the areas where they live and facilitate community participation in policy making and implementation, as well as in service delivery.

One of the main roles of a community worker is to guide and support community members working in community-based projects (such as small business development), projects that help people generate an income, and projects that develop local assets and resources.

Social workers promote social change and wellbeing and empower people to solve relationship problems and reach their potential. Social work is practised in close collaboration with other sectors such as education, development, health, law and business.

What will I do in this career?

- Help communities to develop, plan, grow, maintain, and evaluate their resources, facilities, programmes, and support networks
- Research and help social, environmental, health, and planning officials to develop community service policies, and liaise with community groups, welfare

organizations, government offices, NGOs, and the private sector about community services
- Make recommendations about community development programmes, policies, practices, budgets
- Play an awareness-raising role on issues of concern to those communities (e.g. water conservation and efficient water use)
- Fulfil administrative or clerical duties.

Qualifications and training

These include:

University degrees

- BA: Social Sciences, Community Development
- BSocSc: Social Sciences, Community Development
- BHuman Ecology: Community Agriculture

Note: *A bachelor's degree allows a graduate to register with the South African Council of Social Service Professions (SACSSP) and practise as a social worker.*

National certificates and national diplomas

- National Diploma: Social Work, Social Sciences, Community Development
- Diploma: Agriculture and Home Economics
- Post Basic Diploma in Primary Healthcare
- National Certificate: Fundamental Ancillary Healthcare; Occupational Hygiene and Safety; Community Healthcare Work; Occupational Safety, Hygiene and Environment; Community Development – HIV/AIDS Support; Victim Empowerment and Support
- FET Certificate: Community Facilitation in Society and Environment Interactions

Community Healthcare Work; Probation Work; Child and Youth Care Work; Social Security Administration; Gender Practice; Victim Empowerment Coordination; Community Development and HIV/AIDS Support
- Certificate in Social Auxiliary Work

Learnerships
The Local Government SETA (LGSETA) offers a one-year community development worker learnership that provides training in dealing with the problems and issues facing a community, develops project management and financial skills, and offers the theory and the practical experience required for obtaining a formal qualification.

Graduate development programmes
Internship programmes are available for unemployed graduates with a completed degree or diploma who require work experience to obtain occupational or professional with a professional or ccupational body. Auxiliary workers are admitted to training with a school leaving certificate. One-year certificate courses vary in content according to the type of work chosen. Auxiliary workers include CDWs and other community care and healthcare workers.

Who will employ me?
Community organisations, municipalities, NGOs.

Where can I find out more?
Department of Labour; Health and Welfare Sector Education and Training (HWSETA); Local Government SETA (LGSETA); Health Professions Council of South Africa.

Diver

As a diver, you spend much of your time working in the sea, in inland rivers, or in dams. You can do various types of work underwater. You can do underwater cutting, welding, and rigging, or you can dive to gather information or to retrieve things. You may need to use sophisticated electronic instruments or take underwater photographs. Working underwater can be difficult and potentially dangerous. It can also be exciting and rewarding.

What will I do in this career?
- Pipeline diver – lay, maintain, and repair underwater cables, and pipes that carry water, effluent, gas, or oil
- Civil and mechanical works diver – construct and maintain dam and water works sluice gates and valves; build and maintain quay walls in harbours
- Shipping diver – salvage abandoned or sunken ships; survey, clean, and repair shipping vessels
- Oil rig diver – repair and maintain oil

platforms, oil rigs, and other structures under the sea
- Scientific diver – carry out scientific surveys of the seabed, its reefs, sand profiles, and marine life to gather information about the sea's archaeology, biology, and minerals; explore the seabed for raw materials and food sources
- Navy diver – help during disaster and salvage operations at sea; locate and place underwater objects
- Police diver – recover murder weapons and bodies.

What training and qualifications will I find useful?

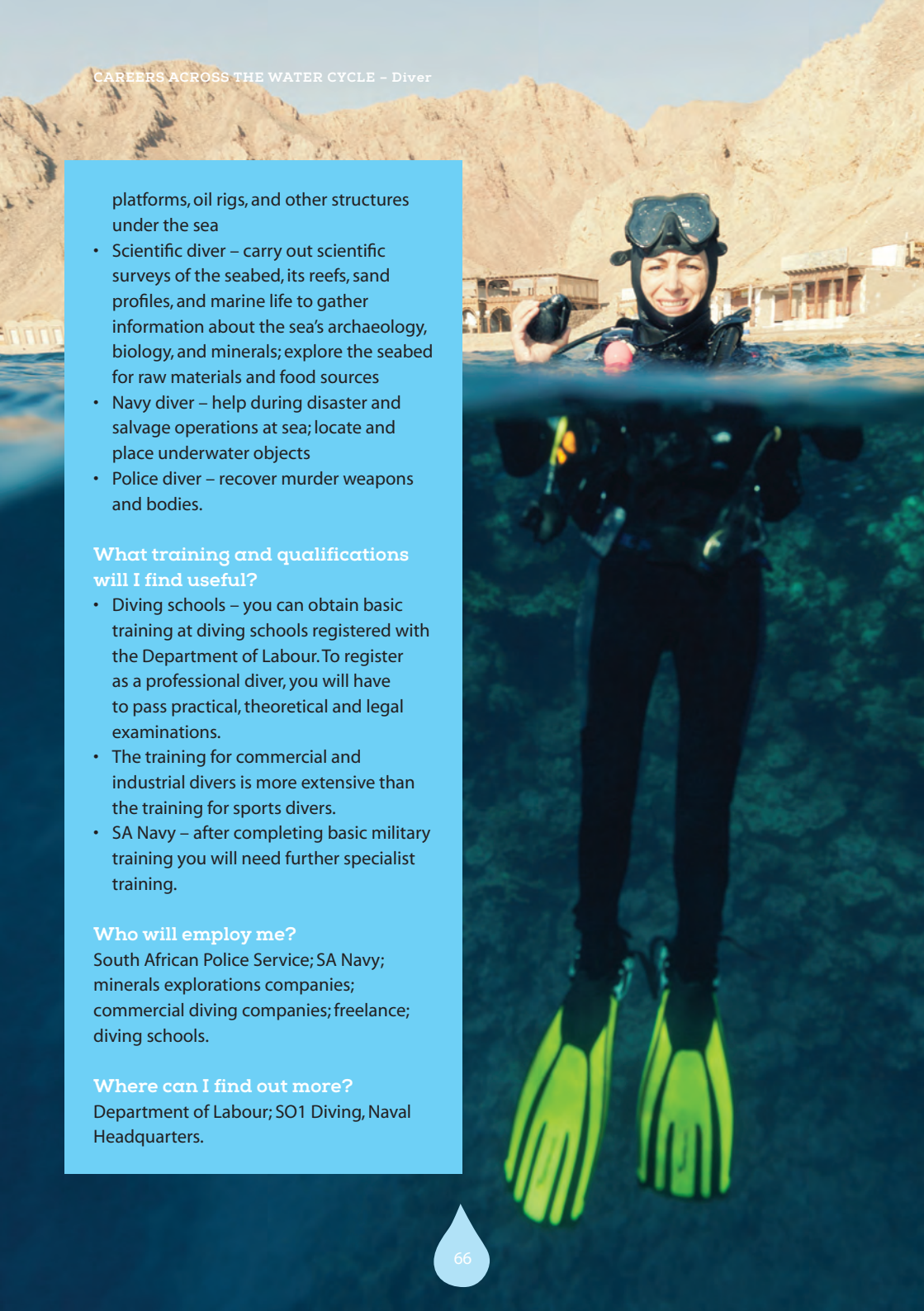
- Diving schools – you can obtain basic training at diving schools registered with the Department of Labour. To register as a professional diver, you will have to pass practical, theoretical and legal examinations.
- The training for commercial and industrial divers is more extensive than the training for sports divers.
- SA Navy – after completing basic military training you will need further specialist training.

Who will employ me?

South African Police Service; SA Navy; minerals explorations companies; commercial diving companies; freelance; diving schools.

Where can I find out more?

Department of Labour; SO1 Diving, Naval Headquarters.



Ecologist

Ecologists study the relationships of plants, animals, and their environments, and the ways that they interact with each other. The physical environment includes light, temperature, solar radiation, moisture, wind, oxygen, carbon dioxide, and nutrients and pollutants in soil, water, and the atmosphere. The biological environment includes living organisms such as plants and animals.

If you are an ecologist working in the world of water (a limnologist), you may work at conserving aquatic ecosystems, or designing nature reserves, or checking the condition of rivers and wetlands by analysing the plants, animals, and fish that live there, or by testing the water. You may study the effects on the ecology of industrial waste water, or you may study the way toxic substances move through the food chain from algae through fish to humans.

Ecology covers many fields such as climatology, hydrology, limnology, oceanography, physics, chemistry, geology, and soil analysis. It can also involve animal behaviour, taxonomy, physiology, mathematics, statistics, and human settlement patterns. Ecology as a scientific discipline helps us to understand and manage ecosystems and environmental problems.

Depending on your speciality, field study can mean long hours of slow work, observing the way particular organisms behave, or recording growth patterns in plants. Some jobs involve more time in the laboratory, testing specimens gathered in the field. Your work back in the office would involve working on computers, analysing field information, writing reports, doing administrative work, and supervising the work of others in a team.

You could use your expertise for environmental impact studies, particularly when building or mining projects are planned in ecologically sensitive areas. You could investigate and advise on human influences and pollution on the natural environment, especially where there are overpopulation, housing, recreational facilities, farming, and industry.

As an ecologist, you could take a special interest in one of these careers:

- **Ecological consultant** – helps to advise on and solve ecological problems; examines the ecological impact of human development and recommends solutions to reduce the effects on plants and animals, for instance
- **Aquatic environment assessor** – assesses aquatic resources; conducts audits; monitors practices that may harm aquatic environments; interprets information as a guide to better management

- **Conservation officer** – helps to protect natural resources (e.g. wildlife, natural vegetation, soil, water) and to use them in a sustainable way. If plants and soil are managed carefully, for instance, it is possible to maintain the natural drainage of waters from the watershed of a region, and to maintain water quality through pollution control
- **Other** – animal scientist; game ranger; aquatic ecologist; water resource manager; water chemist; catchment management agency officer; oceanographer; aquatic scientist*; biologist*; botanist*; microbiologist*; zoologist*.

What will I do in this career?

- Conduct research (e.g. in academic institutions, or as a consultant for government, natural resources industries, and developers)
- Advise on long-term environmental policy and on the impact of specific development projects
- Evaluate government or corporate projects in terms of the way they affect the environment
- Advise or campaign against practices that damage the environment
- Promote protection of the environment as a service to society
- Draw together or synthesise information from a wide range of sources and specialist disciplines, in the life sciences but also economics, social sciences, and/or engineering
- Work on the broad ecological concerns of policy makers, industry, and the general public.

Qualifications and training

These include:

University degrees

- BA: Geography and Environmental Studies; Conservation: Tourism and Sustainable Development; Environmental Health; Environmental Management; Environmental Science and Society; Environmental Studies; Geography
- BSc: Conservation; Ecology; Life Sciences; Conservation Ecology; Plant Ecology
- BEnvironmental Sciences: Ecology and Resource Management
- BEcology: Community Agriculture
- BTech: Nature Conservation
- Postgraduate Diploma: Nature Conservation

National certificates and national diplomas

- Advanced Diploma: Nature Conservation
- Diploma: Nature Conservation
- National Certificate: Nature Conservation; Conservation Resource Guardianship; Conservation: Fisheries Resource Management; Conservation: Natural Resource Management: Terrestrial; Nature Conservation: Resource Guardianship
- National Diploma: Nature Conservation
- National Higher Certificate: Nature Conservation
- FETraining Certificate: Nature Conservation: Natural Resource Guardianship Terrestrial

Who will employ me?

National and provincial conservation authorities; large organisations that manage and produce natural resources

such as energy (e.g. Eskom), wood, fish; consulting firms specialising in environmental impact assessments; NGOs, conservation organisations (e.g. World Wide Fund for Nature), and advocacy groups (e.g. Greenpeace); CSIR; the departments of agriculture; water affairs, the environment; South African National Parks; natural history museums; self-employment as a consultant; catchment management agencies; water boards.

Where can I find out more?

Southern African Institute for Ecologists and Environmental Scientists; Southern African Society of Aquatic Scientists; Health and Welfare SETA (HWSETA).

Economist

As an economist, you develop and apply theories about how people spend their money; processes involving the ways in which goods and services are produced, supplied, and used; and how businesses or governments allocate resources (e.g. natural resources, technology, labour, and capital or finance).

If you are interested in economics, you might consider one of these careers:

- **Environment economist** – studies the environmental impacts of projects and developments; advises industry and government on regulations for environmental and natural resource management; advises government about its responsibilities in terms of international agreements and environment treaties
- **Other** – accountant*; actuary*; agricultural economist*; conveyancer; industrial economist; political scientist*; stockbroker.

What will I do in this career?

- Forecast and analyse trends and advise governments and businesses on economic issues and policies (e.g. taxation levels, wages, prices, employment and unemployment, imports and exports, interest rates and exchange rates)
- Study effects of government economic and monetary policies, expenditure, taxation, and other national budgetary controls
- Identify opportunities to improve efficiency and international competitiveness
- Research, analyse, and record effects on economic and industrial growth of government labour market programmes
- Investigate the types of goods and services that are produced and consumed locally and abroad
- Analyse industrial relations issues (e.g. wages, the effects of industrial disputes on productivity).

Qualifications and training

These include:

University degrees

- BAgriculture: Agricultural Economics
- BCom: Environmental Economics; Economics and Management Sciences; Transport Economics
- BA: Economics; Political, Philosophical and Economic Studies (PPE); Social Sciences
- BAdmin
- BBusiness Science: Commerce, Finance and Economics

- BEcon: Economics; Econometrics; Agriculture
- BSc: Mathematical Sciences; Mathematical Statistics; Agricultural Economic Analysis.
- BTech: Economic Management Analysis

National certificates and national diplomas

- National Diploma: Economic Geology
- National Higher Diploma: Economic Geology
- Diploma: Agriculture and Home Economics
- Postgraduate Diploma: Agricultural Economics

Note: *Postgraduate degrees help an economist with promotion and qualify him or her for higher research and administrative positions.*

Who will employ me?

Higher education institutions; research organisations; manufacturing firms; financial institutions; consulting firms; government departments; self-employment as a consultant.

Where can I find out more?

Financial and Accounting Services (FASSET).

Education/ Training Practitioner

Education and training are essential throughout the world of water, both within organisations (to help, by means of in-service training programmes, to educate and train skilled people for the future and to improve service delivery) and in communities of all kinds, to raise awareness of water, for example, and the need to use it and look after it wisely. It is needed at various levels and in numerous specialist areas.

The principle of lifelong learning in South Africa means that people of any age have access to education and training. As well as school education, there are also adult basic education, professional and vocational training in Further Education and Training (FET) colleges, tertiary education in universities and colleges. If you are interested in teaching and helping other people develop their potential, this is a rewarding field.

In general, the following careers might interest you if you enjoy teaching and helping people to grow and develop their potential.

- **Human resources development practitioner** – in this field you would plan, prepare, and conduct training for employees in industry, businesses, and government departments, to help with skills development and raising productivity (including on-the-job training and apprenticeships)

- **Training officer** – here you plan, develop, implement, and evaluate training and development programmes in organisations
- **Adult educator** – this career is practised mainly in the areas of professional development, adult basic education, skills development, and personal enrichment.

What will I do in this career?

- Plan, design, carry out, evaluate training and education programmes for people with various needs (e.g. specialist or non-specialist; short workshops or longer-lasting interventions)
- Assess training needs and develop training resources (e.g. textbooks or manuals, demonstration models, visual aids)
- Prepare reports and training manuals
- Co-ordinate training and education programmes with the world of work and the experience of those who learn.

Qualifications and training

These include:

University degrees

- BA: Human Sciences; Social Sciences
- BEd
- BEnviroEducation, Training and Development Practice
- BTech: Human Resource Development; Adult Basic Education; Education

National certificates and national diplomas

- National Certificate: Environmental Education, Training and Development Practice; Human Resource Management; ECD Practice
- National Diploma: Personnel Management; Adult Basic Education; ECD Practice
- Advanced Certificate: Environmental Education, Training and Development Practice
- Advanced Diploma: Environmental Education
- FET Certificate: Development Practice
- General Education and Training Certificate: Development Practice
- Higher Education and Training Certificate: Development Practice
- Occupationally Directed ETD Practitioner Certificate

Learnerships

Many institutions of higher learning offer a pre-service undergraduate teaching qualification. In addition, educators already working in schools can upgrade their qualifications by studying towards undergraduate certificates for in-service teachers in various subject areas.
Many tertiary education institutions also offer short courses to develop education skills further.

Who will employ me?

Medium and large organisations (e.g. mining companies); education and training providers; government departments; municipalities.

Where can I find out more?

Department of Labour; Education, Training and Development Practices Sector Education and Training Authority (ETDP SETA); Council on Higher Education; Education, Training and Development Practices; UMALUSI – Council for Quality Assurance in General and Further Education and Training.

Electrical Engineer

Expertise in engineering is needed to design, build, maintain and expand the country's infrastructure. Industrial design and engineering are the foundation of a productive manufacturing sector, which is vital for South Africa's balance of payments and for job creation.

As an electrical engineer, you can work in one of two major areas:

- Electrical power generation and transmission – here you are involved with hydroelectric power stations, coal power stations, solar cells, wind turbines (which are used to generate electrical energy), and high voltage transmission lines and substations (used to distribute electrical energy)
- Electronic engineering – in this area you design and use electronic equipment e.g. computers, telecommunications, antennae, robotics, lighting, control and automation, medical (clinical) equipment, radar, and missile guidance.

Electrical engineers design, develop, and supervise the manufacture, installation, operation, and maintenance of electrical or electronic systems. In the world of water, you would also design pumps and plants. The electrical engineering technologist and electrical engineering technician are part of the electrical engineering team. As a member of that team you work in offices, design centres, laboratories, large constructions, and power stations.

Similar careers and specialisations that may interest you include: automotive engineering technician, broadcasting and sound technician, chemical engineer*, civil engineer*, computer consultant, electrician*, lighting technician, telecommunications electrician, mechanical engineer*, network technician, telemetrics technician, systems technician, satellite communication technician, aeronautical engineering technician, radar technician, microwave engineering technician, television technician, and systems analyst.

What will I do in this career?

- Design, install, test, and maintain electrical motors, generators, alternators, transformers, cables, and switchgear
- Design, install, test, and maintain lighting and electrical systems
- Research ways in which energy resources can be better used
- Manage projects and supervise operating and maintenance staff
- Optimize existing processes and systems
- Design and produce drawings of electrical systems, using computer-aided design (CAD)
- Calculate and specify the arrangements of e.g. circuits, transformers, circuit-breakers, and transmission lines
- Design and install controls and signals for road, rail, and air traffic
- Prepare and interpret specifications, drawings, and regulations for using electric power equipment

- Diagnose and repair faults
- Install and service appliances, refrigeration, and air conditioning.

Qualifications and training

These include:

University degrees

- BEng: Electrical and Electronic: Engineering; Engineering Science; Agricultural Engineering
- BSc: Engineering; Engineering and Environmental Geology; Engineering Science; Electrical and Computer Engineering; Electrical Engineering
- BTech: Engineering; Engineering Technology; Engineering: Electrical
- BTech (Eng): Electrical; Digital Technology; Power Engineering; Mechanical; Telecommunication Technology; High-Frequency Technology; Computer; Clinical; Electronics; Electromechanical; Process Instrumentation

National certificates and national diplomas

- Diploma: Electronic Engineering; Electrical Engineering; Engineering
- National Certificate: Certificated Engineering
- National Certificate: N6: Engineering Studies

Learnerships

Learnerships are available to become an assistant engineering surveyor, an assistant hydrographic surveyor, a geoinformatic technologist , a professional engineering surveyor and hydrographic surveyor as well as a professional land surveyor.

Graduate development programmes

- Advanced Postgraduate Certificate: Engineering
- Postgraduate Diploma: Engineering
- Advanced Postgraduate Diploma: Engineering
- Advanced Diploma: Electronic Engineering

Who will employ me?

Eskom; CSIR; municipalities; engineering consultants; manufacturers of radios, televisions sets, and electrical appliances; television companies.

Where can I find out more?

SA Society for Professional Engineers; Engineering Council of South Africa; Institute of Professional Engineering Technologists; Electrical Engineering and Allied Industries Association; Institution of Certificated Mechanical and Electrical Engineers SA; South African Institute of Electrical Technician Engineers; Energy Sector Education and Training Authority (ESETA).

Electrician

If you become an electrician you will install, maintain, repair, and test electrical equipment and systems for industrial, commercial, and domestic uses. You could also work on electrical and distribution equipment such as high-tension cables, pylons, switchboards, and transformers. You might work in workshops, private homes, or factories. You may have to work in confined spaces, stand for long periods, or work at heights on roofs, towers, and masts. You could specialise in armature winding, cable-splicing, or maintaining high-tension cables. Other, related careers include automotive electrician, refrigeration mechanic, radio and television mechanic, and construction electrician.

What will I do in this career?

- Read and interpret electrical, architectural, and mechanical drawings
- Plan the layout of wiring systems in homes and buildings
- Install, repair, and maintain electrically operated equipment such as water pumps, generators, stoves, refrigerators, and geysers
- Connect electrical equipment (such as circuit breakers, transformers, motors, and heaters) to power supplies
- Make and assemble electrical and electronic components and appliances
- Test for, locate, and repair electrical malfunctions
- Service electricity meters and transformers
- Maintain machines in factories and in waste and wastewater treatment plants
- Erect and insulate pylons and connect high tension cables.

Qualifications and training

These include:

National certificates and national diplomas

- National Diploma: Engineering: Electrical
- National Certificate: N3: Engineering Studies
- National Certificate: Engineering
- Certificate: Electrical Engineering
- FET Certificate: Electrical Engineering
- National N Diploma: Engineering Studies

Learnerships

- Practical in-service training – as an apprentice to a qualified tradesman
- Compulsory trade test – set by the Department of Labour, to qualify as an artisan.

Note: *To become an electrician, you need to be at least 16 years old, with a grade 10 certificate.*

Who will employ me?

DWA; factories; mines; private companies; government departments; municipalities; Eskom; Telkom; self-employed as a contractor.

Where can I find out more?
Electrical Contractors Association of South Africa; South African Institute of Electrical Technician Engineers; Construction Education and Training Authority (CETA); Energy Sector Education and Training Authority (ESETA).

Environmental Engineer

Environmental engineering integrates science and engineering principles to improve our air, water, and land resources. It is concerned with finding solutions for environmental problems that concern our health such airborne diseases and implementing laws that promote good sanitation. It incorporates waste water management and air pollution control, recycling, waste disposal, radiation protection, industrial hygiene, environmental sustainability, and public health issues. Environmental engineers study the effect of technological advances on the environment.

Environmental engineers design municipal water supply and industrial wastewater treatment systems and address environmental issues such as the effects of acid rain, global warming, ozone depletion, water pollution and air pollution.

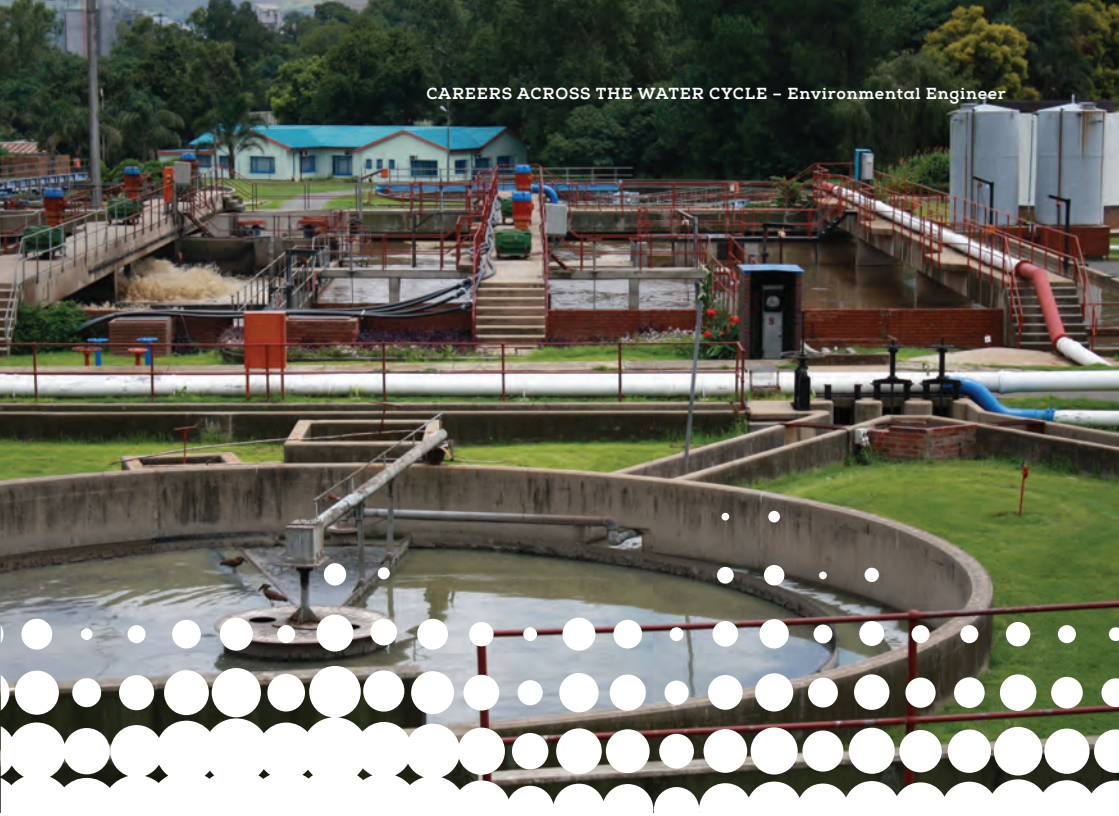
Environmental engineering involves, among others, civil engineering*, chemical engineering*, and environmental sciences. As an environmental engineer, you may specialise in the minerals or chemical industries or in civil engineering projects.

Environmental engineering includes social environment careers such as in **community conservation** and **rural development, environmental education,** and **ecotourism** and as a **cultural resource specialist**.

The aim of **community conservation** is to work with communities to encourage nature conservation, biodiversity and the sustainability of the environment. It helps communities understand the important role conservation can play in the development of sustainable livelihoods.

Current thinking in **environmental education** has changed from education about the environment to education for the environment based on critical action for social change.

Ecotourism offers a tourism that does not change a country's biodiversity. Ecotourism can help also alleviate poverty by creating employment. In ecotourism the people living in and around the tourist area are included in the planning, implementing and maintaining of ecoparks.



What will I do in this career?

- Design, construct, maintain, and operate water filtration plants and sewage treatment facilities
- Make sure that business and industry comply with environment regulations
- Measure and monitor pollution in the atmosphere, soil, and water
- Control floods and soil erosion
- Conduct environmental impact assessments to show the possible consequences of industrial or commercial activity on the environment
- Develop safe methods to dispose of waste
- Use computer modelling to determine the ways in which contaminants from waste disposal sites may spread
- Design clean-up programmes (e.g. where there are oil spills or toxic chemical leaks)
- Manage the treatment and storage of toxic or radioactive materials
- Design and operate waste treatment processes to acceptable standards for discharge or recycling
- Work with occupational health experts to ensure hazard-free working environments.

Qualifications and training

(See also civil engineer; chemical engineer; environmental scientist)
These include:

University degrees

- BA: Environmental Planning and Development; Tourism Development

- BA: Conservation: Tourism and Sustainable Development
- BEnvironmental Sciences: Geography
- BEnvironmental Technology
- BDevelopment Studies
- BEnvironmental Education, Training and Development Practice
- BHuman Settlement Development
- BInstitutional Agriculture: Rural Development Management
- BSc: Conservation Ecology
- BTech: Outdoor Management Development: Nature Conservation
- BA(Hons): Land Reform and Rural Development; Tourism Development

National certificates and national diplomas

- Advanced Certificate: Environmental Education, Training and Development Practice
- Advanced Diploma: Sustainable Agriculture in Rural Development; Environmental Education
- Advanced Diploma: Nature Conservation
- Diploma: Nature Conservation; Agricultural Extension and Rural Development; Developmental Studies
- National Certificate: Nature Conservation; Environmental Education, Training and Development Practice; Conservation Resource Guardianship; Conservation: Natural Resource Management: Terrestrial; Nature Conservation: Resource Guardianship
- National Diploma: Nature Conservation
- National Higher Certificate: Nature Conservation
- FET Certificate: Information Technology: Systems Development; Nature Conservation: Natural Resource Guardianship Terrestrial
- Postgraduate Diploma: Nature Conservation
- Advanced Postgraduate Certificate: Environment and Development
- Advanced Postgraduate Diploma: Environment and Development

Who will employ me?

Government departments; civil engineering consultants; South African National Energy Council; South African National Energy Association; water utilities; Eskom.

Where can I find out more?

Nature Conservation Board; Environmental Education Association of Southern Africa; Engineering Council of South Africa; Institute of Professional Engineering Technologists; Southern African Institute of Ecologists and Environmental Scientists: Society for Professional Engineers; Construction Education and Training Authority (CETA); Local Government, Water, and related Services Sector Education and Training Authority (LGWSETA).

Environmental Health Officer

Environmental health officers are concerned with the effects of the environment on people's health. In this career, you develop, regulate, enforce, and monitor laws and regulations that deal with public health, building, and environment management, so as to promote good health, hygiene, and safety. You may be responsible for different types of public places, including hotels, eating establishments, schools, and childcare centres. You may also work in wastewater treatment and disposal.

You can specialise in areas of air, water, and food quality; controlling the carriers of disease (e.g. mosquito control); removal and disposal of waste, including sewage, surface water and solid waste; environment protection; health education; noise control; and physical, chemical and biological hazards in the workplace.

If you are interested in becoming an environmental health officer, you may also consider these related careers: occupational health and safety officer; health adviser; air-pollution control officer; meat inspector; occupational hygienist.

What will I do in this career?

- Assess water treatment systems; check solid waste disposal sites; look for signs of contamination in the water and soil
- Investigate health-related complaints and inspect facilities (e.g. restaurants, abattoirs, dairies) to check that people are following health regulations
- Inspect sanitation and drinking water in rural areas to prevent the spread of diseases (e.g. cholera and typhoid)
- Inspect public places: e.g. restaurants, shops, or food manufacturers, for standards of hygiene; industries for problems such as asbestos and other dusts, heat or cold stress, noise, and chemicals; high and low pressure in the case of divers and pilots; ports to control entry of travellers from ships and aircraft and prevent contagious diseases from entering the country
- Investigate, issue warnings, and put controls in place (e.g. in cases of malaria or rabies or outbreaks of infectious or communicable diseases)

- Monitor pollution, and collect and test samples of water, food, and other products
- Assess building and develop applications for compliance with environment and health standards, or for suitable wastewater disposal
- Check air quality and take responsibility for insect and pest control
- Advise and educate communities on health and environmental matters
- Maintain records, prepare statistics, write reports, and prepare policy documents, guidelines, pamphlets, and brochures
- Give evidence in court when health or environmental regulations have been broken
- Conduct environmental health impact assessments.

Qualifications and training

These include:

University degrees

- BA: Geography; Environment Studies; Environmental Health; Environmental Management; Environmental Science and Society; Environmental Studies
- BSc: Environmental Science; Geography and Environmental Management; Environmental Management; Applied Environmental Sciences; Life and Environmental Sciences
- BEnvironmental Technology
- BTech: Environmental Health; Environmental Management; Environmental Engineering
- BEnvironmental Sciences: Geography
- BEnvironmental Education, Training and Development Practice
- BA(Hons): Geography: Environmental Studies

National certificates and national diplomas

- National Diploma: Environmental Health; Environmental Management
- FET Certificate: Community Water, Health and Sanitation Facilitation
- National Certificate: Community Water, Health and Sanitation Monitoring
- Certificate: Environmental Management
- National Certificate: Environmental Management; Environmental Assessment Practice
- National Higher Certificate: Environmental Management
- Postgraduate Diploma: Environmental Health

Note: *Environment health officers are registered with the Medical and Dental Council.*

Who will employ me?

Local, provincial, and national government departments (e.g. health, labour, agriculture); large food manufacturers; industries; mines; hotel groups; metropolitan councils, South African Medical Services.

Where can I find out more?

Southern African Institute of Ecologists and Environmental Scientists; Local Government, Water, and related Services Sector Education and Training Authority (LGWSETA); Health and Welfare SETA (HWSETA).

Environmental Protection and Control

If you become an environmental protection officer, you will look after the environment by monitoring the quality of effluents being discharged from individual plants/processes or larger industrial or manufacturing sites. Environment technologists and technicians (sometimes called pollution control technicians) work with other environment professionals such as scientists and engineers to control and prevent pollution.

Officers, technologists, and technicians may be concerned with pollution in streams and rivers near industrial sites, for instance, or problems with managing hazardous waste. They may also be involved in developing new technology to reduce such problems. Their jobs involve work in the field, office work, or laboratory work. The hours can be long, and the work may require travel.

Depending on your field of expertise, you might need to know how to deal with dangerous chemicals or polluted air, soil, and water.

Careers that are similar include: government inspector; hazardous waste technician; air monitoring technologist; chemical technologist; ecologist*; soil scientist*; environmental scientist*.

What will I do in this career?

- Collect and analyse samples to determine the extent of pollution in the water, soil, or air of a particular area
- Communicate with polluters to make sure that they comply with acceptable standards and with the terms of their licences
- Operate and maintain field and laboratory equipment
- Use computers to prepare spreadsheets and graphs and write reports
- Make recommendations for change.

Qualifications and training

(See Environmental Health Officer above)
These include:

University degrees

- BTech: Environmental Sciences; Environmental Health
- BSc: Science; Environment Management

National certificates and national diplomas

- National Certificate: Wastewater Process Control
- National Diploma: Hydro Power Plant Process Control

Who will employ me?

DWA; large industries; municipalities; water boards; government agencies; waste

management companies; water utilities; engineering firms; research laboratories; environment consultancies; oil and gas companies.

Where can I find out more?

Department of Water Utilisation (Chemical Engineering, University of Pretoria); Sasol Centre for Innovative Environmental Management; Pollution Research Group (Department of Chemical Engineering, University of KwaZulu-Natal; Southern African Institute of Ecologists and Environmental Scientists; Health and Welfare SETA (HWSETA).

Environmental Scientist

There are many different kinds of work in environmental science. You can deal with the conservation and management of natural ecosystems in water and on land, habitats, rare or endangered fauna and flora, or nature reserves. The amount of indoor and outdoor work you do depends on your particular position.

- **Environmental scientists** research, observe, measure, record, analyse, and interpret features of the environment. They find ways to control or minimise the harmful effects of human activity on the environment.
- **Environmental officers** ensure that sound management practices are in

place to support plant and animal life on land and in water.

- **Quality assurance officers** influence and carry out decision-making and strategies for managing rivers. You liaise with international, national, regional, and local river forums, committees, and work groups, and take part in river-related research projects.
- **Ecologists, water research officers,** and conservation officers work to conserve aquatic ecosystems and biodiversity. You assess the health of rivers and wetlands; conduct tests on water, and use aquatic plants, invertebrates, and fish as biomonitors or indicators of conditions in the water. A loss of species leads to environmental problems such as the loss of keystone species such as bees. Conservation biology is about providing solutions to many of the world's environmental problems. Conservation planning is also becoming an important area and uses geographical information systems.
- **Environment planners** are geographers who use studies of the environment to prepare plans for solving problems in the environment such as desertification, nature conservation, landscape evaluation, environmental impact, resource ecology.

Some other related occupations and specialisations are: agricultural scientist*; botanist*; chemist*; environment engineer*; environmental technologist; geologist*; hydrographer*; life scientist*, natural resource manager, another is marine biologist*.

What will I do in this career?

- Classification and taxonomy is the classification or taxonomy of all living organisms.
- Research the physical and biological nature of the environment including the conditions of plants, animals, and humans
- Study and assess production processes, environment laws, and physical, biological, and social conditions, and how they affect the environment
- Investigate, report on, and respond to accidents that affect the environment such as chemical and oil spills
- Analyse pollutants, identify their sources, assess their effects on the environment, and recommend methods of prevention and control
- Rehabilitate water, land, and air that has been affected by mining, logging, construction, agriculture, and pollution
- Research matters of immediate and long-term importance to governments and communities. This would include the impact of land clearing on native animals and the impact of waste products on waterways
- Negotiate with and advise government departments, industry, and the public on environment matters such as the management, re-use, and disposal of hazardous materials
- Help to develop policies, strategies, and codes of practice in environment management.

Qualifications and training

These include:

University degrees

- BSc: Biology Earth and Environment Science; Hydrobiology; Plant Biochemistry; Life Sciences; Natural Sciences; Geography and Environmental Management; Geosciences
- BSc: Agric: Agriculture: Biochemistry; Environmental Microbiology
- BTech: Biotechnology; Environmental Sciences; Environmental Health

National certificates and national diplomas

- National Certificate: Biotechnology
- Specialist Certificate: Biology
- Specialist Diploma: Biology
- Certificate: Geographical Science
- Diploma: Geographical Science
- Postgraduate Diploma: Geographical Science

Graduate development programmes

- Specialist and short courses at some higher education institutions

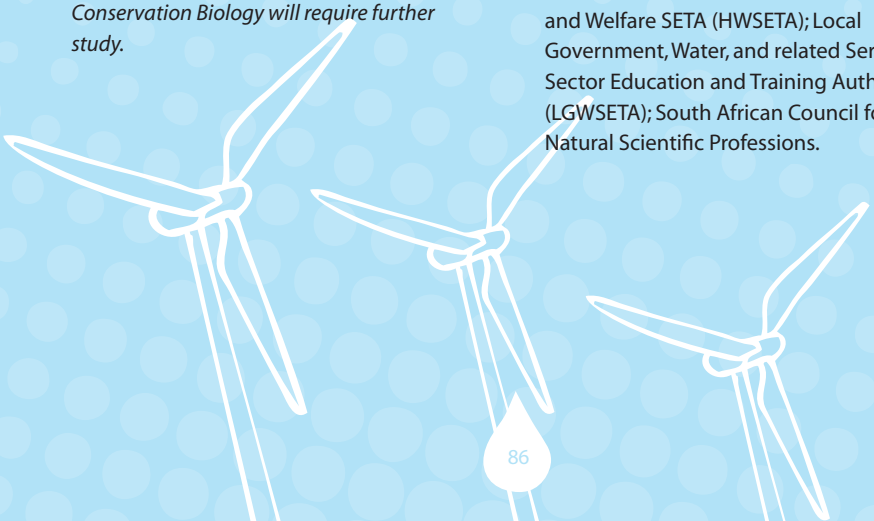
Note: *A career in Biodiversity and Conservation Biology will require further study.*

Who will employ me?

DWA; conservation authorities; science councils; local authorities; higher education institutions; large industries (e.g. Eskom); consulting firms specialising in environmental impact assessments; DEA's Department of Marine and Coastal Management; the South African National Biodiversity Institute; agriculture and forestry organisations; the Department of Water Affairs ; NGOs; eco-tourism organisations; nature and environmental conservation; environmental consulting firms; the Department of Education, the Oceanographic Research Institute, aquaria, museums.

Where can I find out more?

Science councils; SA Institute for Ecologists and Environmental Scientists; Health and Welfare SETA (HWSETA); Local Government, Water, and related Services Sector Education and Training Authority (LGWSETA); South African Council for Natural Scientific Professions.



Fitter and Turner

A fitter and turner manufactures, constructs, assembles, fits, maintains, and repairs components for vehicles, machinery, and other apparatus. This highly skilled trade is essential to most industries. In this career, you spend most of your day working indoors, often in noisy conditions. If this kind of work interests you, you could also consider becoming a boilermaker*, motor mechanic, aircraft assembler, armature winder, aircraft engine mechanic, or airframe fitter.

What will I do in this career?

- Read and interpret blueprints, drawings, or models
- Select and measure exactly the metal material that is needed for the component or apparatus
- Use power tools, such as lathes, drills, mills, or planes, to shape the rough piece of metal
- Fit machine parts
- Inspect, test, repair, and maintain components and machinery
- Construct and maintain waste and wastewater treatment works.

Qualifications and training

These include:

National certificates and national diplomas

- Certificate: Fitter and Turner
- Further Education and Training Certificate: Mechanical Engineering: Fitting
- National Certificate: Mechanical Engineering: Fitting

Learnerships

- Practical training at an accredited training centre
- In-service apprenticeship training supervised by a qualified tradesman
- Compulsory trade test – set by the Department of Labour, to qualify as an artisan.

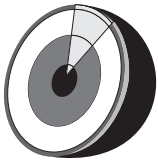
Note: *To be a fitter and turner you need to be at least 16 years old, and have a grade 9 certificate.*

Who will employ me?

Water utilities; large engineering works or industrial plants; factories; iron and steel plants; shipyards; Transnet; mines; garages; government departments; municipalities; aircraft manufacturers.

Where can I find out more?

Steel and Engineering Industries Federation (SEIFSA.); Construction Education and Training Authority (CETA); Manufacturing, Engineering and related Service Education and Training Authority (MERSETA).



Geographer

As a geographer you study the Earth's surface, its land features, climate, vegetation, and physical conditions. You also study and analyse the relationships between human activities and the natural and built environment. A geomorphologist is concerned with the geological aspect of the Earth's land and seafloor surfaces. A fluvial geomorphologist studies the science of river formation. Depending on your areas of interest and specialisation, you could work indoors or outdoors.

Some related occupations are meteorologist*, ecologist*, environmental scientist*, hydrologist*, sociologist*, hydrographic surveyor, anthropologist, agriculturist*, political scientist*, town and regional planner*, cartographer*, geologist*; geographic information systems technologist, and geoinformatics specialist.

What will I do in this career?

- Observe, measure, and collect data and compile or edit maps, charts, and atlases of land surface features, soils, populations, land use, climate, vegetation, and animals
- Analyse and interpret statistical information and satellite imagery to assess and map natural resources, land use, and human activities
- Analyse population data and forecast population trends
- Use remote sensing equipment and computers to generate maps
- Write and present reports and scientific papers
- Help plan human settlement and the built environment
- Analyse and advise on military intelligence
- Consult to governments and organisations on resource management, urban and rural land use, regional economic development, tourism, boundaries, and the environment
- Advise on the location of industrial and commercial sites and public facilities and services.

Qualifications and training

These include:

University degrees

- BA: Geography and Environmental Studies
- BEnvironmental Sciences: Geography
- Bachelor of Geographical Information Science (GISc)
- BSc: Geoinformatics; Geographical Sciences; Geography; Geography and Environmental Management
- BA(Hons): Geography: Environmental Studies

National certificates and national diplomas

- Certificate: Geographical Information System; Geographical Science
- Diploma: Geographical Science
- Postgraduate Diploma: Geographic Information Systems

- Postgraduate Diploma: Geographical Science

Note: *To become a practising geographer you will need advanced postgraduate study.*

Who will employ me?

Urban and rural planning firms; government departments; city councils; tourist agencies; environment consultants; parks boards; universities; CSIR; SANDF.

Where can I find out more?

Society of South African Geographers; Chief Directorate: Surveys and Mapping.

Geologist

Geologists study the materials, structure, and history of the Earth's crust by examining rocks, minerals, fossil remains, and the ocean floor. In this career, you can help to predict the sequence of processes (e.g. earthquakes, glaciers, erosion, sedimentation, and volcanoes) that affect the developing structure of the Earth's surface. Geology is an earth science, or geoscience, and includes knowledge from fields such as physics, chemistry, biology, and palaeontology. Geotechnologists and geotechnicians work closely with geologists.

As a geologist, you gather data in the field and then analyse it in an office and in a laboratory. You may spend time in remote areas such as deserts and the Antarctic. Your hours of work can be irregular.

Similar occupations that may interest you are: hydrologist*, geophysicist, mineralogist, engineering geologist, environmental geologist, cartographer*, geochemist, geotechnologist*, palaeontologist, hydrographic surveyor, petrochemical engineer, geomorphologist, meteorologist*, oceanographer, and geographer*.

What will I do in this career?

- Investigate groundwater contamination and land salinity
- Locate and manage groundwater resources
- Examine, measure, and classify the elements of the Earth's crust
- Prepare geological reports, maps, charts, and diagrams
- Record and analyse computer data
- Use aerial and satellite photographs, research data, and survey results to locate and estimate groundwater as well as gas and oil deposits
- Analyse civil engineering problems such as large buildings, dams, water supply schemes, and tunnels by using testing equipment and drilling machinery
- Use optical, X-ray, heat, acid, and precision instruments to test rocks and soil

- Measure the characteristics of the earth using seismographs, gravimeters, magnetometers, and pendulum devices
- Advise on the economics of extracting minerals, environmental protection, and rehabilitation of land after mining
- Contribute to environmental impact assessments

Qualifications and training

These include:

University degrees

- BSc: Applied Geology; Engineering and Environmental Geology; Geology
- BTech: Geology
- BTech: Engineering: Civil: Environmental

National certificates and national diplomas

- National Diploma: Economic Geology; Geology
- National Higher Diploma: Economic Geology

Graduate development programmes

- BEarth Sciences(Hons): Mining and Environmental Geology
- Postgraduate Diploma: Applied Geology

Note: *To register as a professional scientist with the South African Council for Natural Scientists, you need a minimum qualification of BSc(Hons). A master's degree, however, is a geologist's foundation degree.*

Who will employ me?

DWA; mining and exploration companies; research laboratories; civil engineering companies; environmental management companies; Council for Geoscience; Chamber of Mines; CSIR; Mintek; self-employment as a consultant.

Where can I find out more?

Geological Society of South Africa; Council for Geoscience; Chief Directorate: Surveys and Mapping.

Geophysicist

Geophysics is the physics of the Earth and its environment using quantitative physical methods. Geophysics includes the hydrological cycle such as snow and ice; fluid dynamics of the oceans and the atmosphere; electricity and magnetism in the ionosphere and magnetosphere and solar-earth relations.

Geophysics is applied to the needs of communities such as mineral resources, mitigation of natural hazards and environmental protection. Geophysical survey data are used to analyse potential oil and gas reservoirs and mineral deposits, locate groundwater; to find archaeological relics; determine the thickness of glaciers and soils; and assess sites for environmental remediation.

As a geophysicist, you use physics, mathematics, and chemistry to understand and explain the physical features of the Earth's surface and its interior, as well as its atmosphere and hydrosphere. You often work as part of a team of geoscientists. You could carry out fieldwork, which may involve a lot of travel, often to remote areas.

You could specialise or have a career in:

- **Specialist fields** – such as environmental or groundwater geophysics, borehole geophysics, seismology and seismic interpretation, mineral exploration, engineering geophysics, and computer processing and software development
- **Exploration geophysics** – involves the search for the Earth's resources

What will I do in this career?

- Compute the Earth's shape and composition and the structure of its interior
- Study winds, tides, glaciers, earthquakes, volcanoes, and their effects
- Set up water supply and flood-control programmes
- Analyse the flow patterns of ocean tides and currents
- Prepare navigational charts and maps and environmental reports
- Predict atmospheric conditions
- Examine and measure seismic, gravitational, electrical, thermal, and magnetic forces
- Help to locate petroleum and mineral deposits
- Design, develop and operate computer systems and software for processing and interpreting geophysical data sets
- Develop instrumentation for taking physical measurements as in surveys
- Develop mathematical models to help interpret geophysical survey results.

Qualifications and training

These include:

University degrees

- BSc: Exploration Geophysics; Biology Earth and Environment Science; Earth and Atmospheric Sciences; Applied

Environmental Sciences; Applied Geology; Biology Earth and Environment Science; Engineering and Environmental Geology; Geocomputing; Geoinformatics; Land Surveying; Physical Science
- BEarth Sciences: Geologic: Hydrologic and Meteorologic Studies; Hydrology and Water Resources
- BEarth Sciences(Hons): Mining and Environmental Geology

Who will employ me?
Mining, exploration, and petroleum companies; civil engineering firms; government departments; Chamber of Mines; research institutes and science councils (CGS, CSIR, Mintek); higher education institutions; consulting companies; self-employment as a consultant.

Where can I find out more?
Geological Society of South Africa; Council for Geoscience; South African Association of Geotechnology; Construction Education and Training Authority (CETA).

Geotechnologist

As a geotechnologist, you work in a very complex area, studying the crust of the Earth to help locate and extract natural resources such as water, minerals, and metals, and to determine conditions below the surface. A geotechnologist normally specialises in a particular field. Geotechnologists are assisted by geotechnicians, and in these careers you work mostly outdoors, in all weather conditions.

Other occupations that might interest you include: soil scientist*, geophysicist*, engineering geologist, geologist*, civil engineering technologist*, surveyor*, extraction metallurgist, mining engineer, environment engineer*, and cartographer*.

What will I do in this career?
- Locate and establish the quality of underground water resources (geohydrology)
- Use sophisticated instruments to find water and mineral resources underground and study conditions below the surface (geophysics and exploration geotechnology)
- Global geophysics – deals with the study of the Earth as a whole (including earthquakes, magnetic fields, etc.)
- Analyse rocks, soil, and water using electron microscopes, X-ray diffractometers, and spectographs (geochemistry)
- Locate ores and minerals, and investigate underground conditions regularly to make sure that they are safe for mining (mining geotechnology)
- Investigate the geology of the Earth's subsurface so that large construction projects (e.g. dams, tunnels, bridges)

can be built safely, on firm foundations (engineering geology)
- Find building material (e.g. rocks, granite, marble, limestone) for building projects (geology)
- Other occupations that might interest you include: agricultural chemist; agricultural scientist*; agronomist; algologist; astronomer; biophysicist; chemist*; ecologist*; geochemist; geographer*; geohydrologist; geologist*; geotechnologist*; metallurgist; meteorologist*; mineralogist; oceanographer; palaeontologist; physicist.

Qualifications and training

(See also Geophysicist above)
These include:

University degrees
- BSc: Earth Sciences; Applied Earth Sciences; Applied Geology
- BSc(Eng): Environmental Engineering
- BSc: Engineering and Environmental Geology; Geology
- BTech: Geology; Exploration and Mining Geology
- BEarth Sciences (Hons): Mining and Environmental Geology

National certificates and national diplomas
- National Diploma: Geology; Economic Geology
- National Higher Diploma: Economic Geology
- Postgraduate Diploma: Applied Geology

Note: *to work as a geotechnician, a National Higher Diploma (Geology) is recommended. MTech and DTech degrees are recommended for geotechnologists.*

Who will employ me?

Mining companies; DWA; civil engineering practices; universities; government departments; laboratories and research institutes; self-employment as a consultant.

Where can I find out more?

Geological Society; Council for Geoscience; South African Association of Geotechnology; Local Government, Water and related Services Sector Education and Training Authority (LGWSETA).

Human Resources/ Personnel Manager

As a human resources (or personnel) manager, you would be concerned with people at work and their relationships with each other and with the organisation. Your job description depends on the type and size of the organisation for which you work: bigger companies normally have a department in which different staff members manage particular sections (e.g. staffing, training or human resource development, organisation planning and development, labour relations, remuneration, research, and administration).

If you are interested in human resource management, you could also consider careers such as:

- **Industrial relations manager** – ensures smooth relations and negotiations between the employer and trade unions and employees' associations
- **Other** – administrator*; counsellor; economic adviser; human resources/ personnel consultant or officer; psychologist; social worker*; sociologist*; vocational guidance officer; training officer.

What will I do in this career?

- Recruit, select, evaluate, appoint, and place staff in suitable posts
- Keep employee records
- Coordinate promotions, transfers, dismissals, retirements, salary increases, and reinstatements, make forecasts about employment needs, and help to plan personnel policies to meet the needs of employers and employees
- Coordinate the company's performance management, productivity, and motivation procedures
- Arrange staff training and development
- Solve personnel problems
- Advise about health and safety in the workplace and promote employee welfare (e.g. through benefits, leave, housing schemes, medical aid)
- Keep up to date on labour laws, advise staff about their obligations and rights, and make sure that the organization follows labour laws, wage agreements, and conditions of service
- Represent management in negotiations with trade unions and employees.

Qualifications and training

These include:

University degrees

- BA: Management
- BBusAdmin
- BBusSci: Management Studies
- BCom: General; Management
- BEd (Senior and FET Phases): Economics and Management Science/Human and Social Science

National certificates and national diplomas

- Diploma: Business (with specialisations in Accounting, Management, Marketing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Management, Human Resource Management); Advanced Management; Business Science
- Human Resource Management Diplomas – SA Institute of Management (SAIM), in collaboration with private colleges
- National Certificate: N3 Business Studies: Accounting/Administration
- Advanced Certificate: Accounting and Business Administration

Who will employ me?

Large and medium-sized organizations and companies; government departments; provincial administrations and utilities; local government.

Where can I find out more?

South African Institute of Management; Institute of People Management; Services SETA (SSETA).

Hydrologist

Hydrologists study water in streams, rivers, and underground. They evaluate different processes in the water cycle, such as rainfall, evaporation, groundwater, and river flows so as to find out how much water is available and how reliable is the supply. You could be involved in environment management, controlling soil erosion, and developing water resources. You might also advise civil engineers on the flow of rivers, where to build dams and reservoirs, and how to minimise and control the risk of floods. Most hydrologists spend time in an office and doing fieldwork.

If you are interested in hydrology, you might also consider these careers:
- **Hydrometry technician** – supports and assists engineers and hydrologists; designs and plans storage dams, canals, tunnels, pipelines, and pumping and irrigation schemes
- **Hydrogeologists** – (also known as geohydrologists) scientifically investigate and evaluate underground water resources; work with groundwater and moisture variation in the soil; locate the position of waste disposal dumps; evaluate groundwater pollution
- **Geohydrological technician** – gathers data about boreholes, measures groundwater levels, and provides information for the geohydrologist
- **Hydrological modelling** – these models are simplified representations of the hydrologic cycle. They are mainly used for hydrologic prediction and for understanding hydrologic processes. Recent research uses a more global approach to understanding water systems
- **Water resources assessment** – contributes to the knowledge of and promotes the understanding and proper use of natural water resources
- **Other** – chemist*; ecologist*; hydrobiologist; civil engineer*.

What will I do in this career?

- Select, install, and maintain instruments that measure and monitor flow, water levels, rainfall, and water quality
- Measure water levels in rivers, lakes, and underground
- Help design and plan dams, canals, bridges, irrigation projects, water supply schemes, and flood protection
- Collect and analyse water and sediment samples
- Use underwater acoustic equipment to search for obstacles in lakes and dams
- Prepare reports on sites and data collection that can be used by other professionals
- Gather data on boreholes
- Identify potential drilling sites
- Develop ways to bring fresh water to rural and urban areas and to irrigate very dry land for growing better crops
- Create awareness of groundwater in schools, communities, local authorities, and among the general public.

Qualifications and training

These include:

University degrees

- BEarth Sciences: Geologic: Hydrologic and Meteorologic Studies; Hydrology and Water Resources
- BSc: Hydro Science; Hydrobiology; Hydrobiology and Physiology; Hydrology; Applied Geophysics, Geology
- BTech: Engineering: Civil: Environmental

National certificates and national diplomas

- National Diploma: Hydro Power Plant Process Control; Hydrographic Surveying

Learnerships

The DWA offers service training programmes.

Note: *An honours degree is the minimum requirement for working as a hydrologist.*

Who will employ me?

DWA; CSIR; municipalities; engineering companies; town and city councils; water utilities.

Where can I find out more?

DWA; Council for Geoscience; Engineering Council of Southern Africa; Institute for Soil, Climate and Water of the Agricultural Research Council; South African Association of Geotechnology; Local Government, Water, and Related Services Sector Education and Training Authority (LGWSETA); Construction Education and Training Authority (CETA); School of Bioresources, Engineering and Environmental Hydrology (University of KwaZulu-Natal); The Institute for Water Research (Rhodes University).

Ichthyologist/Fisheries Scientist

Ichthyology is the branch of zoology devoted to the study of fish. Icthyology supports the sustainable use and study of fish and fisheries. An ichthyologist or a fisheries scientist is a person who studies and manages the fishery resources. This may involve shellfish or aquatic mammals as well as fishes. Ichthyologists are involved in work all over the world.

Most ichthyologists are employed in academia, applied research, aquaculture, fisheries management, stock assessment, conservation or sport fisheries management.

Ichthyology specialities include:

- **Aquaculture** – fish farming and management
- **Fisheries science** – the study and management of fish resources
- **Conservation** – the preservation of natural fish populations
- **Taxonomy** – specialising in working with fish displays in museums
- **Education** – lecturing and teaching

Other careers in related fields of study include marine biologist*, limnologist*, aquaculturist* and aquatic scientist*.

What will I do in this career?

- Field studies such as taking on-site samples from the ocean or fresh water areas
- Laboratory work including testing the water levels and filtration systems; checking for diseases and monitoring breeding patterns
- Research
- Writing and presenting reports
- Lecturing and teaching
- Attending international and local conferences and sharing knowledge
- Medicating fish
- Managing and transporting fish

Qualifications and training

These include:

University degrees

- BSc: Zoology
- MSc: Ichthyology

Note: *Postgraduate study specialising in Ichthyology, Fisheries Science or Aquaculture is strongly recommended. Rhodes University is the only university in South Africa to offer degrees in Ichthyology.*

Who will employ me?

National and local agencies, such as the Marine and Coastal Management; South African National Parks; Water Research Commission; tertiary institutions; museums; aquariums; aqua conservations agencies such as Conservation International and the World Wildlife Fund; fish or shellfish farms.

Where can I find out more?

Water Research Commission; Marine and Coastal Management; Rhodes University.


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ADD TO FRIEND?
email!
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Like
PUSH
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Information Technology Specialist

People who work in information technology (IT) are involved in computer programming, designing and analysing computer programs (systems analysis), administering databases and networks, operating computer systems, and designing hardware.

If you have a career in IT, you have to keep up-to-date with rapid developments. IT-related occupations (not covered below) include website designer, network controller, computer consultant, electronics engineer, computer support technician, and Internet services and support technician.

What will I do in this career?

- **Computer programming** – is the compilation of a sequence of instructions to perform a specified task with a computer. The program in its human-readable source code form enables a programmer to study and develop its algorithms. A collection of computer programs and related data is referred to as the software. Computer source code is typically written by computer programmers.
- **Systems analyst** – researches problems, plans solutions, recommend software and systems and coordinate development to meet business or other requirements. They are not normally involved in hardware or software development. They are expected to liaise between vendors and information technology professionals. They may be responsible for developing cost analyses, design considerations, staff impact assessments, and implementation timelines.
- **Software developer** – is concerned with facets of the software development process. The work includes researching, designing, implementing, and testing software. They participate in design, computer programming, or software project management.
- **Systems architect** – establishes the basic structure of the computer system, defines the essential core design features and elements. They help define a users' vision of what the system needs to be and do.
- **Computer engineer** – designs and implements large computer systems to solve problems for large organisations; integrates various technologies such as computer systems, telecommunications, and software engineering; establishes data, voice, and image communicating systems; designs computer systems.

Qualifications and training

Aptitude tests – you normally have to take aptitude tests before any type of IT training These include:

University degrees

- BA: Information Management
- BAdmin: Information Management
- BBusSc: Information Systems
- BComputer and Information Sciences
- BInformation Science

- BInformation Systems (BIS)
- BInformation Technology
- BSc: Applied Information Systems; Applied Information Technology; Information Systems; Information Technology: Computer Science
- BTech: Business Information Systems; Information Technology
- BA(Hons): Information Science

National certificates and national diplomas

- Diploma: Information Technology Programming
- Advanced Certificate: Information Systems Management; Information Technology
- Advanced Diploma: Information Technology
- Advanced Diploma: Management: Information Technology
- Certificate: Business Information Technology; Computer Programming and Information Systems; Information Systems
- Diploma: Business Information Technology; Computer Programming and Information Systems; Information Systems; Information Technology; Information Technology Programming
- National Certificate: Information Technology; Information Technology
- National Higher Certificate: Information Technology
- University Diploma: Information Technology
- Certificate: Advanced Information Technology
- FET Certificate: Information Technology: Systems Development
- National Diploma: Information Technology
- Postgraduate Diploma: Geographic Information Systems; Information Studies

Learnerships

- Short courses – there are many short courses that you can take to obtain and update your qualifications
- In-service training – (computer operator); after a year's experience, you can write the Computer Users Council of South Africa's Computer Operator Proficiency Examination (COPE)

Who will employ me?

Finance and banking sectors; Internet service providers; government; education institutions; mining; businesses; provincial administrations; computer bureaux; Telkom; self-employment as a consultant.

Where can I find out more?

Computer Users Council of South Africa; South African Society for Professional Engineers; Engineering Council of South Africa; Information Technology Association of South Africa; Institute of Professional Engineering Technologists; Information Systems, Electronics and Telecommunications Technologies (ISETT).

Instrument Maker

An instrument maker designs, manufactures, installs, and repairs instruments. An instrument mechanician specialises in installing, troubleshooting, and repairing instrumentation, automation and control systems. In this career, you also ensure that automatic processes and plant systems operate efficiently.

Instrument makers and mechanicians can specialise in different types of instruments:

- Hydraulic – flow meters, pressure gauges
- Meteorological – automatic weather stations, electronic airport systems, radar
- Chemical – thermometers
- Mechanical – pressure gauges, odometers, thermometers, watches
- Electrical – voltmeters, kilowatt gauges, ammeters
- Optical – telescopes, spectacles, cameras
- Medical and dental – pincers, scalpels, scissors
- Avionics – instruments used in aeroplanes
- Telecommunications – telephones, satellites.

With similar levels of training, you could also consider the careers of, for example, biomedical technologist, scientific glassblower, laboratory technician, and electrical engineering technician.

What will I do in this career?

- Design and manufacture instruments
- Work according to sketches and instructions from scientists and engineers
- Install and diagnose faults in electronic instruments and control systems
- Calibrate and make sure that instrumentation equipment is working correctly
- Repair and maintain instruments and systems.

Qualifications and training

These include:

National certificates and national diplomas

- National Certificate: Vocational: Process Instrumentation

Learnerships

- Theoretical training at a FET college
- Practical training at an accredited training centre
- In-service training as an apprentice under the supervision of a qualified instrument maker
- Compulsory trade test, set by the Department of Labour, to qualify as an artisan.

Who will employ me?

CSIR; Eskom; Sasol; municipalities; chemical engineering businesses; electrical precision tool manufacturers; opticians; South African Airways; Telkom; DEA.

Where can I find out more?

South African Institute of Measurement and Control; Steel and Engineering Industries Federation; Manufacturing, Engineering and Related Services Education and Training Authority (MERSETA); Information Systems, Electronics and Telecommunications Technologies (ISETT).

Journalist/Media and Communication Practitioner

Journalism is the profession of reporting, writing, photographing or editing news about events, issues, and trends via mass media outlets such as television, radio, and print media. Topics range from politics and business to culture, arts, and entertainment. The internet is significantly changing the way in which information is now being reported.

Communication is the process of passing on or exchanging information, ideas, or feelings through speech, gestures and signs. Technology allows communication across distances, by computer of telephone, and to large audiences through the mass media.

Communication, public relations and journalism are interdisciplinary professions that require a broad spectrum of knowledge and skills. A good start is an undergraduate degree specialising in a particular area such as law or economics together with communication or journalism courses. Diplomas and certificates also offer professional entry to a range of careers in marketing, advertising, management, design, and production.

What will I do in this career?

- **Broadcast Journalist** – researches, writes, presents and analyses news for a listening audience
- **Print Journalist** – researches, writes, presents and analyses news and interesting stories and articles
- **Digital Media Producer** – changes a brief from a corporation or business into video footage for use by a corporation for advertising or proposition purposes via television or multimedia
- **Digital Photographer** – will cover corporate or other functions and events. They must be proficient in software packages such as Photoshop or PaintShop Pro
- **Corporate communicator** – conveys the image that an organisation wishes to present to the public. It includes facts and information about an organisation's activities and the values and principles that it represents. They will have to research, write and analyse information for public consumption.

Qualifications and training

These include:

University degrees

- BA: Applied Journalism; Journalism; Communication; Communications Management; Corporate Communication; Media and Communication
- BJournalism and Media Studies
- BCommunication: Business
- BTech: Journalism
- BA(Hons): Journalism

National certificates and national diplomas

- Advanced Certificate: Journalism
- Certificate: Journalism
- Diploma: Journalism and Media Studies
- National Diploma: Journalism
- Certificate: Journalism for Print and Digital Media
- FET Certificate: Journalism
- Diploma: Journalism
- Postgraduate Diploma: Journalism
- Postgraduate Higher Diploma: Journalism

Learnerships

- In-house training in publishing and the print media and links theory to practice.
- Experience and mentorships can be supplemented with short courses.
- Public and private institutions offer certificates in various aspects of media work
- The Sol Plaatje Institute for Media Leadership at Rhodes University offers short-term professional courses for practising mid-career media managers including: Essentials of Newspaper Management; Essentials of Broadcast Management; Essentials of People Management; Government Media.

Who will employ me?

Large and medium sized corporations; newspapers; magazines; publishers; broadcasting companies; government departments; universities.

Where can I find out more?

Information Systems, Electronics and Telecommunication Technologies Sector Education and Training Authority; Media, Advertising, Publishing, Printing and Packaging Sector Education and Training Authority (MAPPP SETA).

Laboratory Worker/Analyst

As a laboratory technician or technologist, you help scientists (in the physical, chemical, biological, and life sciences) by collecting samples, carrying out experiments, taking measurements, and recording results. If you become a chemical laboratory technician or technologist, you will help to develop, produce, and use chemicals and related products. You may also help to design and install equipment and train or supervise production line operators in a chemical factory. You may have to learn how to handle hazardous materials.

Some occupations that may also interest you are chemist*, chemical engineer*, food technologist, medical laboratory technician, physicist, electronic engineer, and analytical chemist.

What will I do in this career?

- Test materials, production processes, and final products
- Set up, clean, and maintain equipment for use in experiments
- Collect, classify, and preserve specimens and samples, such as animal and plant tissues, food, soil, and water
- Test specimens for chemical composition, bacterial content, and chemical contamination, and use scientific equipment to analyse results
- Inspect and test plants and animals for diseases
- Carry out calculations and prepare graphs and reports, often using computers
- Conduct quality control checks on production line samples and materials.

Qualifications and training

These include:

University degrees

- BSc: Agriculture: Biochemistry
- BSc: Chemistry; Plant Biochemistry; Pure and Applied Chemistry
- BSc: Physical Sciences: Environmental Chemistry
- BTech: Laboratory Management; Chemistry

National certificates and national diplomas

- FET Certificate: Laboratory Analysis: Chemical
- National Certificate: Analytical Chemistry
- National Diploma: Analytical Chemistry

Who will employ me?

CSIR; DWA; government departments; Council for Mineral Technology; chemical manufacturing industries; educational institutions.

Where can I find out more?

Chemical and Allied Industries' Association; Chemical Industries Education and Training Authority (CHIETA); Health and Welfare Sector Education and Training Authority (HWSETA); Local Government, Water and related Services Sector Education and Training Authority (LGWSETA).

Lawyer

As a lawyer, you provide legal advice, write documents, conduct negotiations on legal matters, and you may represent clients in courts of law. Not all lawyers practise as legal professionals; you can also use your knowledge in business-related matters such as industrial relations, taxation, commercial transactions, the incorporation of new companies, and journalism.

Lawyers or attorneys offer services to clients in all aspects of law, including company law, criminal law, taxation, contracts, leases, wills, and trusts. You would represent your clients in a magistrate's court, although you would spend less time in court than an advocate. Part of your job would be to prepare cases for presentation in court by an advocate. Advocates conduct criminal cases and civil cases. You would also provide written legal opinions.

Legal advisers give advice on legal matters to individuals, organisations, and businesses. You would not act on their behalf; instead you would brief an attorney to do so. Paralegals or legal assistants help lawyers to solve legal problems and in preparing cases for court. They also liaise with the public and carry out legal research.

Environmental/natural resources lawyers study a system of complex and interlocking statutes, common law, treaties, conventions, regulations and policies that seek to protect the natural environment which may be affected, impacted or endangered by human interactions. Students with an LLB qualification can enrol for a Master of Law (LLM) in environmental law.

Much of a lawyer's time is spent in offices and law libraries reading, researching and writing, and meeting with clients and colleagues. You often work long hours, especially during trials and negotiations.

If you are interested in a career in law, you may also like to consider state prosecutor, state attorney, conveyancer, notary, magistrate, clerk of the court, registrar of deeds, legal researcher, legal secretary, and patent attorney.

What will I do in this career?

- Advise clients on their legal rights, responsibilities, and problems that may arise
- Represent clients in negotiations and in front of courts and tribunals
- Research rules, regulations, laws, and previous cases
- Prepare legal documents such as contracts and wills
- Interpret law and apply it to specific situations
- Collect money from people who do not pay their debts ('collection work')
- Register deeds for the transfer of land.

Qualifications and training

These include:

University degrees

- BA: Law
- BCom: Law
- BLaws
- LLB
- LLM

National certificates and national diplomas

- Certificate: Environmental Law; Law
- Diploma: Environmental Law; Law
- National Diploma: Law: Paralegal Studies
- Postgraduate Diploma: Environmental Law; Law; Maritime Law

Note: *Before being allowed to practise, an attorney with an LLB serves two years under articles of clerkship with a South African firm of attorneys, performs community service for at least one year at an approved office of the Legal Aid Board or an accredited law clinic, or serves articles of clerkship of a year and attends a four-month training course. He or she also writes the attorneys' admission examination administered by the Law Society.*

To become a member of the Bar (the professional association of advocates), an advocate must complete four months of pupillage (practical experience) under the supervision of a practising advocate, and pass the Bar examination administered by General Council of the Bar of South Africa.

Who will employ me?

Law firms; the state; in-house counsel for large companies; government agencies; non-government organisations; public interest groups; provincial and local government; legal-aid societies; law schools; private practice; legal departments of banking institutions and insurance companies; Deeds Office; Receiver of Revenue; South African Police Services.

Where can I find out more?

General Council of the Bar of South Africa; law societies; Department of Justice; Police, Private Security, Legal and Correctional Services Sector Education and Training Authority (POSLECSETA).

Leisure and Recreation Provider

Tourism, leisure, and recreation are the fastest growing industry in South Africa, and offer an exciting future – in the area of water-related leisure activities as well as ecotourism and many others. There are job opportunities in the hospitality industry for entrepreneurs as well as in medium or large national and international leisure and recreation businesses. The hours can be long and irregular, particularly during busy times of year.

If leisure, sport, and recreation interest you as a career, there are many to choose from, such as working as a tourist manager, tour operator tour guide, tourist information officer, travel agent, or recreation manager/officer.

What will I do in this career?

- Escort and look after people on holiday
- Manage groups of holidaymakers and plan tours and entertainment
- Inform clients and visitors about the places they are visiting and deal with their problems and enquiries
- Deal with the finances and administration of tourism and leisure activities.

Qualifications and training

These include:

University degrees

- BA: Conservation: Tourism and Sustainable Development; Tourism; Tourism Development
- BCom: Tourism; Tourism Management
- BSc: Ecotourism
- BTech: Ecotourism Management; Tourism Management
- Bachelor: Tourism Management
- BA(Hons): Tourism Development

National certificates and national diplomas

- Certificate: Tourism Management; Advanced Game Ranging and Lodge Management
- Diploma: Ecotourism Management; Tourism Management; Travel and Tourism Management
- National Certificate: Ecotourism Management
- National Diploma: Ecotourism Management
- National Higher Certificate: Ecotourism Management; Tourism Management
- Specialist Certificate: Travel and Tourism
- Specialist Diploma: Travel and Tourism
- National Certificate: N6: Tourism Postgraduate Diploma: Tourism Management

Learnerships

- South African Tourism Board (Satour) registration (for tour guides)


+4000?

Who will employ me?

Game farms; guest houses; holiday resorts; hotels; South African National Parks; tour operators; self-employment/freelance work.

Where can I find out more?

South African Tourism Board (Satour); higher education institutions.

Manager

As a manager, you provide leadership for organisations to achieve their objectives. Managing a business includes organising, researching, planning, controlling, and directing all or part of the work of other employees. You would need to manage and motivate people so that they do their jobs well, and you might also need to manage resources, such as finances and assets.

Different types of managers perform different tasks:

- **Top management** – includes the chairman, board of directors, managing director or chief executive officer, and other high-ranking managers
- **Functional managers** – manage specific functions or divisions within a company, such as administration, marketing, finances, or buying
- **Operation/production managers** – are responsible for the way a business works, for example, credit and cost control, or production
- **General manager** – is the chief manager, responsible for the work of a number of managers with specific responsibilities. She or he will have a broad background and does not work as a specialist in any particular field; this work combines functional and operational management
- **Management consultant** – works independently as an adviser to businesses on management matters; investigates problems and provides solutions; helps with strategic planning.

As a manager, you would work in an office, but may need to travel locally and abroad. Related occupations include accountant*, banker, and human resources or personnel manager*.

What will I do in this career?

- Set standards and targets for your team
- Decide on policies and processes
- Assess the performance of the organisation
- Direct the way your division or organisation uses resources, including personnel, finances, technology, and physical assets such as buildings and equipment
- Help with preparing budgets, forecasts, and reports
- Select staff
- Authorise the use of funds.

Qualifications and training

These include:

University degrees

- BA: Management
- BBusSc: Management Studies
- BCom: Management
- BAgric: Management; Rural Resource Management
- BConstruction Management: Built Environment
- BEnvironmental Sciences: Ecology and Resource Management
- BSc: Agriculture: Agribusiness Management; Geography and Environmental Management; Land Management; Water Resource Management
- BTech: Environmental Management; Laboratory Management
- BBusAdmin
- MBA

National certificates and national diplomas

- Certificate: Environmental Management; Logistics Management
- Diploma: Advanced Management; Ecotourism Management; Nature Management
- National Certificate: Environmental Management
- National Diploma: Environmental Management
- National Higher Certificate: Environmental Management
- Advanced certificate: Accounting and Business Administration; Business Administration
- National Certificate: N3 Business Studies: Accounting/Administration
- Advanced Postgraduate Diploma: Land Information Management
- Advanced Postgraduate Diploma: Protected-Area Management

Learnerships

- In-service training
- Short courses offered by a variety of universities, FET colleges and private colleges

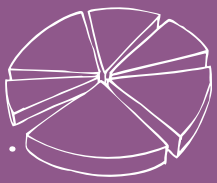
Who will employ me?

Every organisation needs managers.

Where can I find out more?

South African Institute of Management; Institute of Business Management; Institute of Chartered Business Management of Southern Africa; Institute of Business Studies; Services Sector Education and Training Authority (SSETA).

Marketing Specialist



- **Marketing management** – coordinate and manage the total marketing function; plan marketing campaigns; carry out research; create marketing aids such as brochures; formulate marketing policies; evaluate the effectiveness of marketing strategies
- **Product and brand management** – control product branding, packaging, labelling, pricing, advertising, promotions, and distribution
- **New product development** – research and provide ideas and facts about consumer need for a product or service; collect information about competitors' products and services
- **Promotions** – manage promotions campaigns to increase sales; develop promotions, competitions, and special offers to convince consumers to buy
- **Advertising** – promote a product or service via the media
- **Public relations** – keep the public informed about new products, policy changes, and staff changes; keep management informed about public attitudes and reactions to the company and its products or services
- **Selling** – as a sales clerk, sales representative, telemarketer, or door-to-door salesperson, you would give information and try to persuade consumers to buy
- **Sales management** – prepare forecasts and budgets; organise, supervise, recruit, and train sales staff; evaluate sales performance; liaise with dealers and distributors; monitor the preferences of customers
- **Market research** – establish facts about consumers, the effectiveness of advertising, and consumer awareness of an organisation's products or services; analyse and interpret marketing information; design questionnaires; write reports; conduct detailed studies of sales records to determine trends and to help plan campaigns and set goals
- **Marketing/customer service** – support the sales staff; advise customers; help with exhibitions.

Qualifications and training

These include:

University degrees

- BCom: Management
- BBusSc: Management Studies

National certificates and national diplomas

- Diploma: Diploma: Business Science; Business (with specialisations in Accounting, Management, Marketing Management,
- Higher Diploma: Commerce: Marketing Management
- National Diploma: Advanced Journalism and Marketing
- National Certificate: Agri Sales and Services
- National Diploma: Agri Sales and Service Management
- National Certificate: N5 Business Management

Learnerships

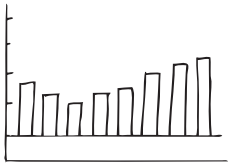
- Some FET colleges and universities offer short courses in marketing or marketing management

Who will employ me?

Any industry or business that sells products and services; advertising agencies; marketing companies; shops; independent research organizations; self-employment as a consultant.

Where can I find out more?

Institute of Marketing Management; South African Institute of Management; Southern African Marketing Research Association; Media, Advertising, Publishing, Printing and Packaging Sector Education and Training Authority (MAPPP SETA).



Mathematician/ Statistician/Actuary

A mathematician has an extensive knowledge of mathematics and uses this knowledge to solve mathematical problems, develop mathematical theories and methods. In this work, you solve problems by applying mathematical principles and models and by carrying out operational research and numerical analyses.

Mathematicians involved with solving problems outside of pure mathematics are called applied mathematicians. They are mathematical scientists who work with many of the problems faced by related scientific fields, engineering, business, and industry. Applied mathematicians work in the study and formulation of mathematical models.

A statistician collects, classifies, and analyses numerical information to make decisions and forecasts, for example, and to evaluate processes.

An actuary is a statistical expert, working on information to do with mortality, illness, unemployment, insurance, and retirement. Actuaries also advise life insurance companies on ways of investing their money and to manage the risks of policy liabilities.

Other occupations that require above average mathematical skills include economist*, financial analyst, accountant*, and, in the field of information technology*, systems analyst, and computer scientist.

What will I do in this career?

- Develop mathematical models to describe natural phenomena such as weather, ocean currents, or soil erosion
- Apply calculus and geometry to design objects and structures in such fields as computer graphics, robotics, architecture
- Analyse networks to study communication systems, airline routes, and road systems, for example

- Use linear programming for town and regional planning
- Process images and signals for radar, astronomy, cartography, and medical imaging
- Analyse statistics and create models for insurance risks, clinical trials, market research, or traffic flow
- Develop actuarial models for financial and insurance markets
- Analyse processes and solve problems in service, manufacturing, chemical, mining, agricultural, and engineering industries
- Develop information theory and communications technology
- Design computer programs that create and break very complex security codes.

Qualifications and training

These include:

University degrees

- BSc: Applied Mathematics; Mathematical Sciences; Mathematical: Physical and Statistical Sciences; Mathematics; Physical Science and Mathematics;

National certificates and national diplomas

- Certificate: Advanced Mathematics
- National Diploma: Mathematical Technology
- Specialist Certificate: Mathematics
- Specialist Diploma: Mathematics
- Postgraduate Diploma: Mathematical Sciences

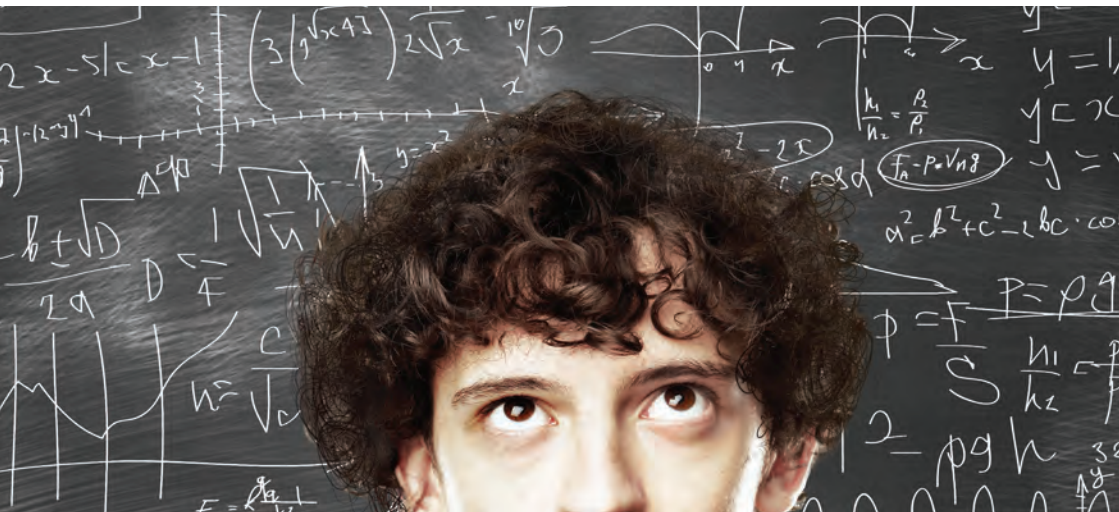
Note: *To qualify as a mathematician, you need a minimum of an honours degree. To teach at a higher education institution or carry out high-level research, you will need a master's or doctoral degree in mathematics, statistics, or actuarial science.*

Who will employ me?

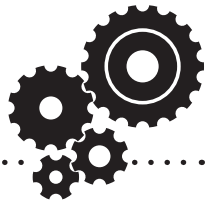
CSIR; Eskom; mining and manufacturing industries; government departments; insurance and investment companies; educational institutions; Stats South Africa; financial institutions; insurance and pension brokers.

Where can I find out more?

South African Mathematical Society; Stats South Africa; Actuarial Society of South Africa.



Mechanical Engineer



As a mechanical engineer you design, develop, produce, install, operate, test, and maintain machinery and mechanical equipment. Such equipment is used in nearly every type of industry and technology, from producing chocolate bars to aeronautics. Mechanical engineers work closely with other professionals and are assisted by mechanical engineering technologists and technicians. In this career, you spend most of your days in offices, in front of computers, and in manufacturing facilities and research laboratories. You might also visit plants and construction sites.

Mechanical engineers, technologists, and technicians normally specialise in a particular field and the mechanical equipment associated with it. Here are a few examples:

- Water – design and construct waterworks and waste and wastewater treatment plants
- Power generation – steam, water, gas, and nuclear turbines used for driving power generators
- Agriculture – tractors, threshing machines, harvesters, milking machines, and packing machines

What will I do in this career?

- Design machines, equipment, or systems, normally on computer
- Calculate costs, availability of materials, and strength and maintenance requirements
- Research different types of fuel and energy, materials handling, heating and cooling processes, storing and pumping liquids and gases, and environmental controls
- Construct, test, and inspect experimental equipment and machinery
- Record data, plot graphs, analyse results, and write reports
- Develop, make, and assemble mechanical systems or parts
- Design and construct resource development projects such as offshore platforms, gas plants, and mining facilities
- Design and supervise the operation of manufacturing process plants including pumping stations, vehicle production plants, power stations, sewerage plants, and water supply
- Put in quality control systems.

Qualifications and training

These include:

University degrees

- BEngineering: Mechanical Engineering
- BSc: Engineering: Mechanical Engineering
- BTech: Engineering: Mechanical

National certificates and national diplomas

- National Diploma: Engineering: Mechanical
- National Higher Certificate: Engineering: Mechanical

- Advanced Technical Diploma: Applied Mechanical Engineering Manufacturing
- Certificate: Introductory Mechanical Engineering
- Diploma: Mechanical Engineering
- FET Certificate: Mechanical Engineering Skills
- National Certificate: Mechanical Engineering

Who will employ me?
Government departments; municipalities; Eksom; Sasol; aircraft and navigation companies; mines; car manufacturers; Transnet; South African National Defence Force; consulting engineering firms; universities.

Where can I find out more?
South African Society for Professional Engineers; Engineering Council of South Africa; South African Institution of Mechanical Engineering; Institute of Professional Engineering Technologists; Institution of Certificated Mechanical and Electrical Engineers, South Africa; Construction Education and Training Authority (CETA); Energy Sector Education and Training Authority (ESETA); Manufacturing, Engineering and Related Services Education and Training Authority (MERSETA).

Microbiologist

Microbiologists study the anatomy, genetics, and physiology of micro-organisms such as bacteria, fungi, and viruses, and the ways in which these micro-organisms interact with their environment. Most microbiologists specialise in the environmental, food, agricultural or medical aspects in either medical or industrial microbiology; virology; immunology; or bioinformatics.

In this kind of work, you use your knowledge to improve human quality of life and help to manage the environment.

Specialists in the broad field of microbiology include:

- **Bacteriologists** – work in the field of bacteriology and study bacteria
- **Environmental microbiologists** – work in the field of environmental microbiology and study microbial processes in the environment
- **Food microbiologists** – work in the food industry and study pathogenic micro-organisms that cause foodborne illness and spoilage
- **Industrial microbiologists** – generally work in biotechnology and study micro-organisms that produce useful products
- **Medical microbiologists** – are medical doctors that have chosen to specialise in the diagnosis and treatment of microbial diseases

- **Mycologists** – work in the field of mycology and study fungi
- **Virologists** – work in the field of virology and study viruses
- **Microbial epidemiologists** – study the role of micro-organisms in health and illness
- **Immunologists** – study how the body defends itself against viruses.
- **Other** – agricultural scientist*; aquatic scientist*; biologist*; botanist*; ecologist*; entomologist; horticulturist; medical technologist; microbiologist*; pharmacist; zoologist*.

What will I do in this career?

Depending on your particular interests, as a microbiologists you would:

- Diagnose and control the microbes that infect humans, animals, plants, and food
- Conduct controls on products and processes
- Deal with freshwater pollution
- Study the appearance and activities of harmful organisms in water or foods to determine their fitness for human or animal use
- Isolate organisms that cause disease and, after research, develop the means to prevent or treat it
- Assist in the manufacture of chemicals and certain industrial processes
- Assist in controlling unwanted microbial activities that cause loss or damage (e.g. degradation of fuel, corrosion of iron tubing, breakdown of textiles)
- Develop environmental, medical, veterinary, industrial, and other practical applications (e.g. development of vaccines and antibiotics).

Qualifications and training

These include:

University degrees

- BSc: Agriculture: Environmental Microbiology
- BSc: Biology Earth and Environment Science; Hydrobiology; Hydrobiology and Physiology
- BTech: Biotechnology

National certificates and national diplomas

- Specialist Diploma: Biology
- Specialist Certificate: Biology

Who will employ me?

Agricultural research organisations; science councils; government; waste treatment industries including local governments; tertiary institutions; hospitals, clinics; healthcare facilities; medical research councils and institutes; industries concerned with food and fermentation; pharmaceutical industries; pathology practices.

Where can I find out more?

Agricultural Research Council; science councils; universities; Southern African Institute for Ecologists and Environmental Scientists; Education, Training and Development Practices SETA; utilities.

Nature Conservationist

Nature conservation is concerned with resource use, allocation, and protection. Its primary focus is on maintaining the health of the natural world, its fisheries, habitats, and biological diversity.
A secondary focus is on materials conservation and energy conservation, which are important to protect the natural world. Climate change is among the most pervasive threats to the Earth today.

What will I do in this career?

Ecotourism managers look after all aspects of game ranches including conservation research and management of natural resources and biological diversity

Nature Conservationists are involved in the following:

- work to alleviate the effects of climate change, harmful emissions
- protect the oceans by halting water pollution and wasteful and destructive fishing
- protect biodiversity, rain forests; the ecology on which animals, plants and people depend
- work towards sustainable agriculture, soil conservation and erosion control
- promote the use of energy-efficient technologies
- conserve local flora, fauna and natural habitats
- conduct regular ecological surveys to take inventory and update the status of biodiversity assets to establish an ecological database
- conservation of water resources

Qualifications and training

These include:

University degrees

- BA: Environmental Management; Environmental Planning and Development; Environmental Studies
- BCom: Environmental Economics
- BEnvironmental Sciences: Ecology and Resource Management
- BEnvironmental Technology
- BSc: Biology Earth and Environment Science; Environmental and Resource Studies; Environmental Management; Environmental Science; Life and Environmental Sciences
- BTech: Nature Conservation; Environmental Health; Environmental Management; Ecotourism Management; Game Ranch Management
- BA(Hons): Geography: Environmental Studies

National certificates and national diplomas

- Advanced Diploma: Nature Conservation
- Diploma: Nature Conservation; Nature Management
- National Certificate: Nature Conservation; Environmental Management: Resource Guardianship
- National Diploma: Nature Conservation; Environmental Health; Environmental Management; Ecotourism Management; Game Ranch Management
- National Higher Certificate: Nature Conservation; National Higher Certificate: Environmental Management

- Certificate: Environmental Management
- FET Certificate: Nature Conservation: Natural Resource Guardianship Terrestrial; Environmental Practice
- Postgraduate Diploma: Nature Conservation; Environmental Health

Who will employ me?

DWA; conservation authorities; local authorities; tertiary institutions; consulting firms specialising in environmental impact assessments; Department of Tourism; Department of Marine and Coastal Management; the South African National Biodiversity Institute; agriculture and forestry organisations; the Department of Water Affairs ; eco-tourism organisations; nature and environmental conservation.

Where can I find out more?

Department of Tourism; South African Council for Natural Scientific Professions; the Tourism, Hospitality and Sport Education and Training Authority (Theta).

Plumber

A plumber installs, maintains, and repairs pipes, plumbing systems, and plumbing fixtures in houses, factories, plants, and construction sites. Plumbers are needed wherever fresh water must be supplied and wastewater removed. As a plumber, you work indoors and outdoors, in all sorts of weather. You have to work overtime if there are emergencies.

You can specialise in installing irrigation systems (e.g. for parks and golf courses) or sprinklers (used in fire protection systems). With similar levels of training, you could also become a boilermaker*, pipe-fitter, fitter and turner*, welder*.

What will I do in this career?

- Take measurements and make drawings to show where fixtures, such as taps, must be placed and pipes connected
- Measure, bend, cut, and thread pipes
- Join pipes by bolting, gluing, blazing, screwing, and soldering
- Find and replace broken valves
- Clear drains and pipes
- Find and mark positions for connections
- Cut holes through walls, floors, and ceilings to accommodate pipes
- Install equipment such as boilers, pumps, heating and cooling systems, geysers, and solar water heating systems
- Install fixtures such as wash-basins, baths, toilets, taps, and industrial processing units
- Maintain and repair plumbing systems
- Hook up water and drainage pipes to municipal sewer systems.

Qualifications and training

These include:

Learnerships

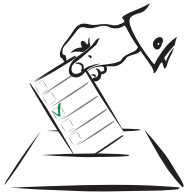
- Competency-based modular training – at a Building Industries Federation of SA (BIFSA) training college or other accredited training centre
- Practical training – as an apprentice to an employer
- Compulsory Department of Labour trade test – to qualify as an artisan.

Who will employ me?

Government departments; municipalities; public utilities; shipbuilders; plumbing contractors; self-employment.

Where can I find out more?

Building Industries Federation of South Africa; Institute of Plumbing South Africa; Construction Education and Training Authority (CETA).



Political Scientist

As a political scientist, you study the way people behave politically as individuals, groups, and as a large mass and their relationship to society and the economy. You also study the origin, development, functioning, and interactions of political institutions and movements such as governments, political parties, and international laws. You develop theories, analyse studies, and write reports that help others make decisions, determine policy, and initiate change. Some related occupations are diplomat, attorney*, journalist, economist*, and social scientist*.

Particularly pertinent to the water industry is hydropolitics, which is the politics around the availability of water and water resources, a necessity for all life forms and human development. Water resources are scarce in most parts of the world and the increasing pressure of over-population is straining this resource. This field deals, for example, with the positioning of dams, tunnels, etc. that affect more than one country, and riparian water rights the system for allocating water.

What will I do in this career?

- Research in areas such as political philosophy, political party systems, and international relations
- Develop and carry out public opinion surveys
- Work in areas where there is dispute over water rights
- Present research and survey results for use by government, NGOs, political parties, and international institutions
- Write articles for newspapers and magazines to inform the public
- Present political information on television and radio as a political commentator.

Qualifications and training

These include:

University degrees

- BA: Law; Politics
- BCom: Law
- BLaw
- LLB

Graduate development programmes

- BA(Hons): Political Science; Politics
- BAdmin(Hons): Political Science

Note: *For research positions, you will need at least an honours degree, but preferably a master's degree.*

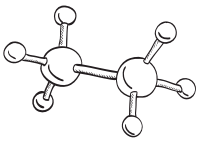
Who will employ me?

Research units attached to universities; HSRC; government departments; market research companies; Department of Foreign Affairs.

Where can I find out more?

HSRC; Diplomacy, Intelligence, Defence, and Trade Education and Training Authority (DIDTETA).

Polymer Scientist/ Technologist



Polymer technology is the manufacture, processing, analysis and application of long chain molecules. Polymer materials include plastics, paints, rubber, foams, adhesives, sealants, and varnishes. Industries that are totally dependent on polymers include information technology, aerospace, music, clothing, medical, motor manufacturing, building, packaging, and many more.

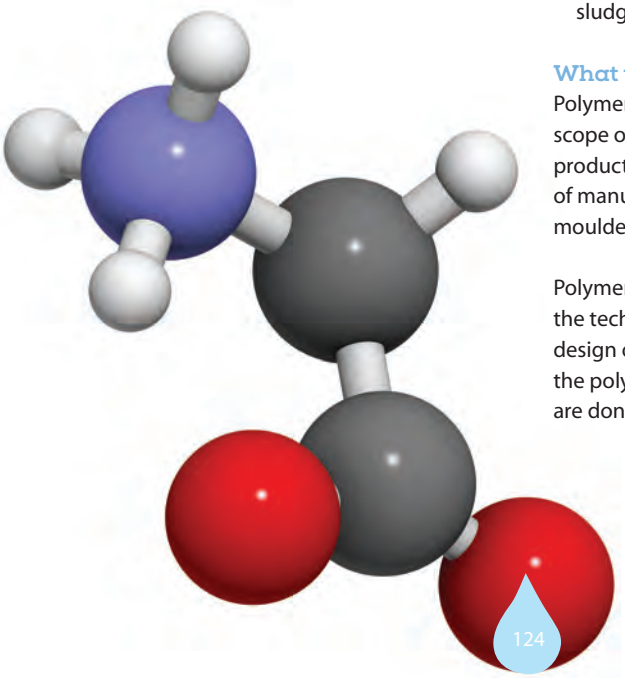
Chemistry forms the basis and starting point of polymer technology but it also leans on other scientific study-areas such as engineering and manufacturing.

Current research involves multidimensional analytical techniques for complex polymers, advanced macromolecular architectures, structure/property relationships of polymeric materials, complex polymer materials and polymer nanocomposites as well as aspects of textile science.

Polymer science comprises three main sub-disciplines:

- **Polymer chemistry** – is concerned with the chemical synthesis and chemical properties of polymers
- **Polymer physics** – is the study of the bulk properties of polymer materials and engineering applications
- **Polymer characterisation** – is concerned with the analysis of chemical structure and morphology and the determination of physical properties in relation to compositional and structural parameters

- **Nanotechnology** – is the manipulation of matter on an atomic and molecular scale. Nanotechnology is defined as the manipulation of matter with at least one dimension sized from 1 to 100 nanometres. Nanotechnology as defined by size is very broad, including fields of science as diverse as surface science, organic chemistry, molecular biology, semiconductor physics, and microfabrication. The Water Research Commission is involved in nanotechnology research and development projects, mostly in the treatment of water and wastewater from domestic, industrial and mining sources and for environmental rehabilitation, such as the treatment of acid mine drainage. Nanotechnology has endless potential applications from drinking water treatment, treatment of sewage, new water pipes that are hydrophobic and do not corrode, to innovative ways of removing metals from wastewater. Water treatment for rural communities using nanotechnology has already been tested as a pilot project in South Africa.
- **Desalination** – is the process of removing salt and other minerals from water.
- **Water treatment technology** – covers industrial-scale processes that make water more acceptable for use. This can be for drinking water, grey water for industry, and many other uses. The goal of all water treatment process is to remove contaminants in the water, or reduce the concentration of such contaminants so the water becomes fit for use. The processes involved in treating water for drinking purpose may be solids separation using physical processes such as settling and filtration; chemical processes such as disinfection and coagulation; biological processes, for example, aerated lagoons, activated sludge or slow sand filters.



What will I do in this career?

Polymer technology offers a diverse scope of opportunities, for example in production and production management of manufactured goods such as tyres, moulded plastic articles, and paints.

Polymer technologists are also found in the technical divisions of companies were design of manufactured products and the polymer mixtures to produce them are done.

There is enormous potential for entrepreneurs to establish their own businesses manufacturing polymeric goods such as moulded plastic or rubber articles.

Polymer scientists and technologists:

- Carry out detailed chemical analysis using sophisticated instruments and techniques
- Problem solving, research and consultative work using amongst other skills, analytical techniques for polymer analysis
- Marketing of polymer raw materials and manufactured products
- Study the composition of polymer chemistry and physics
- Undertake nanotechnology research
- Observe, research, analyse, and interpret results
- Study and research desalination and water treatment technology.

Qualifications and training

These include:

University degrees

- BEarth Sciences: Hydrology and Water Resources
- BSc: Aquatic Science; Natural Sciences; Biochemistry; Chemistry; Environmental Chemistry; Plant Biochemistry;Pure and Applied Chemistry; Community Water Services and Sanitation; Water Resource Management
- BTech: Polymer Technology; Hydrology; Water Care; Analytical Chemistry; Chemistry; Biotechnology
- MTech: Chemistry Research
- MTech: Chemistry Coursework
- MSc: Nanoscience
- MSc and PhD in Polymer Science

National certificates and national diplomas

- FET Certificate: Community Water, Health and Sanitation Facilitation
- National Certificate: Water Purification Process Operations; Biotechnology
- National Diploma in Polymer Technology
- Specialist Certificate: Biology
- Specialist Diploma: Biology

Who will employ me?

Universities, research institutes (such as Institute for Water Research; Institute of Natural Resources); science councils (e.g. CSIR); government departments (e.g. DWA, DEA); water utilities; SABS.

Where can I find out more?

Universities; Southern African Society of Aquatic Scientists; Local Government, Water, and related Services Sector Education and Training Authority (LGWSETA); Chemical and Allied Industries Association; Chemical Industries Education and Training Authority (CHIETA), Institute of Waste Management Southern Africa; Water Institute of Southern Africa.

Process Controller (Hydroelectric Power Plant)

As a hydroelectric power plant process controller, you operate and control instruments and machinery used for generating electric power, and you would work mainly indoors. (In a hydroelectric power plant, water falling from a higher to a lower level turns turbines that spin the generators that produce electricity.) Coal-fired or nuclear power plants also need process controllers.

What will I do in this career?

- Control the flow of water by operating control instruments
- Start up or shut down turbines to change power output
- Make sure that the machinery, control instruments, switchboards, and other systems are working properly
- Compile records and reports on equipment performance, switching operations, and instrument readings
- Clean, maintain, and repair equipment
- Control and supervise power plant operations
- Respond to emergencies such as fire and floods.

Qualifications and training

These include:

National certificates and national diplomas

- National Diploma: Hydro Power Plant Process Control; Hydrographic Surveying

Who will employ me?

Eskom.

Where can I find out more?

UNISA Water Care Division; Construction Education and Training Authority (CETA); Local Government, Water and related Services Sector Education and Training Authority (LGWSETA).

Process Controller (Water and Wastewater)

As a water and wastewater process controller, you control the supply and storage of water, and treat water to purify it and remove waste so that it becomes safe to drink, use, and discharge into the environment. In general, water process controllers treat water coming from the environment (e.g. streams, rivers, boreholes), while wastewater process controllers remove harmful household and industrial substances from liquid waste so that the water can be reused or discharged safely into the environment. In smaller plants, you may handle both water and wastewater treatment; in larger plants you may specialise in a particular process. Process controllers can also work in the chemical, power generation, and some food and beverage industries.

Process controllers are assisted by water services works technicians and water care technologists.

You may work indoors, in noisy plants and in offices, though most of South Africa's plants are outdoors. Water plants operate 24 hours a day, so you may need to work shifts. During emergencies, such as after a heavy rainstorm, which may cause large amounts of liquid waste to flow into sewers, you may need to work overtime.

You may also be interested in the related careers of: process operator, process control technician, sewage plant operator, microfiltration specialist, separation technologist, biotechnologist, chemist,* laboratory technician*, mechanic, water treatment researcher, chemical engineer*, and civil engineer*.

What will I do in this career?

- Collect, test, and analyse water samples for their chemical and bacterial content
- Regulate the treatment and distribution of water by operating computerised control systems
- Read, interpret, and adjust meters and gauges
- Inspect, monitor, and make minor repairs to equipment such as pumps, motors, filters, and chlorinators
- Maintain logs and write reports
- Service and clean water storage facilities, plants, and pipes
- Control the addition of purifying chemicals and the aeration of wastewater
- Supervise staff and train new operators.

Qualifications and training

These include:

University degrees

- BTech: Water Care

National certificates and national diplomas

- National Certificate: Water Care
- National Diploma: Water Care
- National Higher Certificate: Water Care

Learnerships

- In-service training and various short courses – offered by FET colleges and universities

Note: *For more details, see also the notes for civil engineer, chemical engineer, biochemist, chemist, laboratory worker, and mechanical engineer.*

Who will employ me?

Sasol; municipalities; water boards; DWA; mining companies; Eskom

Where can I find out more?

National Community Water and Sanitation Training Institute; Local Government, Water and related Services Sector Education and Training Authority (LGWSETA); WISA Water Care Division.

Public Relations Professional

In the field of public relations, you work at creating and maintaining a good image of your organisation and showing the public what is attractive or appealing about it. You establish two-way communication between an organisation and its audiences, for example clients, other businesses, government, shareholders, special interest groups, employees, and communities. You could work long hours, especially if there is an emergency or a crisis, and you may need to travel extensively.

If you are interested in public relations, you may also be interested in a career in advertising, marketing*, journalism*, and human resources* or personnel consulting.

What will I do in this career?

- Build and maintain a favourable image of the organisation
- Communicate with employees via, for example, internal newsletters
- Get involved in the activities of the community
- Write press releases and articles for newspapers, magazines, radio, or television so that the public can become aware of the organization's projects and achievements
- Use advertisements to tell the public what the organization's attitude is towards certain issues such as the environment or health
- Organise special events such as displays, exhibitions, seminars, conferences, golf tournaments
- Crisis communication about, for example, accidents or industrial strikes at the organisation
- Write and deliver speeches

- Advise management on strategies and policies
- Keep management aware of public attitudes and concerns
- Help prepare annual reports and proposals for various projects.

Qualifications and training

These include:

University degrees

- BA: Communications Management
- Bachelors' Degree: Creative Brand Communications

Learnerships

- Certificate – Basic Principles of Public Relations (through the Public Relations Institute of Southern Africa (PRISA) via private colleges)
- Diploma – Public Relations (through PRISA or the Institute of Administration and Commerce (DAC) via private colleges)

Who will employ me?

Government departments; municipalities; mining houses; welfare and community organisations; business and industrial organisations; colleges and universities; self-employment as a consultant.

Where can I find out more?

Public Relations Institute of Southern Africa; Media, Advertising, Publishing, Printing and Packaging Sector Education and Training Authority (MAPPP SETA).

Researcher

Researchers add to the knowledge in their particular field. As a researcher you look at what is known in your specialist area, and you test theories to see how true they are. You collect information and organise it in ways that make us look at it in a new way. You also are encouraged to develop new technologies where possible.

If you are a researcher involved in the natural sciences in basic or fundamental research, you study and try to uncover underlying principles and laws that govern the bio-physical world. If you are a researcher involved in applied research, you look for practical ways to apply basic research. Both kinds of research are necessary. The more we know and learn, the more applications are possible.

Innovation is an end product of both kinds of research. This term refers to the process of turning an idea that has been generated through research, into a new or improved product, process, or approach that addresses the real needs of society and involves scientific, technological, organizational, or commercial activities.

The innovation process has three stages:

- **Theoretical conception** – developing new knowledge or a new idea
- **Technical invention** – converting an idea into a practical application or object or process
- **Commercialisation** – making inventions into products that improve performance, have economic value, create wealth, and improve quality of life.

What will I do in this career?

As a researcher, you could work in almost every field of study, performing different tasks in each (e.g. fieldwork, laboratory work, archival investigation, case studies, and surveys). You would always need specialist knowledge in a particular research area.

In the field of water quality, for instance, we need to understand basic principles, generate new ideas, and keep updating our information. We need to solve water quality problems. We also need to create new and efficient ways to find water, transport and use it, conserve it, and keep it clean. Researchers in the many fields and disciplines connected with the water cycle gather and analyse data from dams, rivers, oceans, aquifers, and the atmosphere. These specialists have a key role to play in higher education and government projects, as they keep improving water supply and water quality management practices. They also help private industry to design better processes for cleaning water and reusing waste.

Research in chemistry, for example, includes analysis (what compounds are made up of), synthesis (building compounds up from their components), and mixture (bringing substances together without changing their molecular structure). You may work in laboratories or in the field or in chemical processing plants, alone or as part of a team of professionals and technicians. You may also work in offices and educational institutions. Depending on the type of research you conduct, you may have to handle dangerous or hazardous materials. Research biochemists work in laboratories in universities, biotechnology companies, science councils, and agricultural, medical, veterinary, and industrial institutes. In this field, you try to understand better than before the metabolism, growth, and reproduction of fungi, bacteria, plants, and animals, as well as the organisation of viruses. You often use techniques of genetic engineering and molecular biology.

Qualifications and training

PhD – in a research field

Who will employ me?

Higher education institutions; science councils; government departments; research and development divisions and laboratories within large companies.

Where can I find out more?

Higher education institutions (departments associated with your research interests); science councils; National Advisory Council on Innovation; Education, Training and Development Practices SETA (ETDP SETA); Chemical Industries Education and Training Authority (CHIETA); Health and Welfare SETA (HWSETA); subject-related societies, institutes, and associations.

Social Scientist

Social scientists are concerned with the origin and development of human society, and the institutions, relationships, and ideas in life in society.

As a social scientist you would probably work regular hours in an office, and often as part of a multidisciplinary research team. Travel may be necessary to collect information and to study communities.

If you are interested in a career in the social sciences, you could consider the following:

- **Sociologist** – examines the ways in which social groups (e.g. families, tribes, and communities) and institutions (e.g. religious, political, and business institutions) interact and influence each other and the behaviour of individuals. Sociologists are also concerned with socio-economic developments. Researchers in this field help lawmakers, educators, administrators, and others to solve social problems and formulate public policy. In this career, you can specialise, for instance, in racial and ethnic relations, social psychology, sex roles and relations, or criminology
- **Industrial sociologist** – applies the principles of sociology to the organisation of workers and to the relationship between workers and employers, and is concerned with labour relations in complex industrial societies
- **Anthropologist** – studies the origin, development, and functioning of human societies and cultures, now and in the past, by looking, for example, at religion, family and kinship systems, languages, art, music, and economic and political systems. As an anthropologist, you may specialise as an applied anthropologist (who could work in social policy and planning, community development, and land claims); a physical anthropologist (concerned with the evolution and variations of the human species and people's interactions with their environment); a linguistic anthropologist (who studies languages and how they influence, and are influenced by social life); and a social/cultural anthropologist (who compares different cultures).

As a social scientist you would probably work regular hours in an office, and often as part of a multidisciplinary research team. Travel may be necessary to collect information and to study communities.

If you are interested in the social sciences, you may also be interested in becoming an economist*, political scientist*, psychologist, criminologist, archaeologist, towns and regional planners*, human resources or personnel managers*, historian, social worker*, and museum curator.

What will I do in this career?

- Collect information and analyse and interpret data, using computers
- Conduct surveys and in-depth interviews
- Live in the community being studied

- Write reports and advise government departments and community organisations.

Qualifications and training

These include:

University degrees

- BEd (Senior and FET Phases): Economics and Management Science/Human and Social Science
- BSocial Work

National certificates and national diplomas

- National Certificate: Vocational: Safety in Society
- FET Certificate: Community Facilitation in Society and Environment Interactions

Who will employ me?

Research units attached to universities; HSRC; market research companies; community organizations; municipalities.

Where can I find out more?

HSRC; Health and Welfare Sector Education and Training (HWSETA).

Social Worker

South Africa has a severe shortfall in the number of social work graduates. This is a fulfilling profession that promotes social change and wellbeing and empowers people to reach their potential and to cope with problems caused by poor social conditions, unemployment, and poverty. Social work is practised in close collaboration with other sectors such as education, development, health, law and business, and social workers can also work in private practice.

As a social worker, you would identify the problems and needs in a community such as housing, day-care for pre-school children, rehabilitation centres, facilities for people with disabilities, and recreation facilities. You may focus on medical social work, child and family welfare, care of the elderly, working with people who have mental or physical disabilities, drug and alcohol abuse, offenders, or school social work.

Some related occupations are: sociologist*, psychologist, anthropologist, nurse, community worker*, and criminologist.

What will I do in this career?

- Research and administration
- Undertake case work, organise group activities or facilities for people with similar problems, or work with whole communities
- Interview clients at home or at the office
- Write reports about clients for welfare organisations, schools, and courts of law
- Train auxiliary social workers.

If you are interested in the social sciences, you may also be interested in becoming an economist*, political scientist*, psychologist, criminologist, archaeologist, town and regional planner*, human resources or personnel manager*, historian, social worker*, and museum curator.

Qualifications and training

(See also Social Scientist above).
These include:

University degrees

- BSocial Work

National certificates and national diplomas

- National Certificate: Vocational: Safety in Society; Community Development; Victim Empowerment and Support
- FET Certificate: Community Facilitation in Society and Environment Interactions; Child and Youth Care Work; Social Security Administration; Gender Practice; Victim Empowerment Coordination; Community Development and HIV/AIDS Support
- Certificate in Social Auxiliary Work

Note: *A BSocial Work allows a graduate to register with the South African Council of Social Service Professions (SACSSP) and practise as a social worker.*

Graduate development programmes

Internship programmes are available for unemployed graduates with a completed degree or diploma who require work experience to obtain occupational or professional registration as a social worker with a professional or occupational body.

Learnerships

People at all educational levels can build careers for themselves in health and social services.

- Home-based caregivers are often people with little formal training, but a desire to help in the community
- Auxiliary workers are admitted to training with just a school leaving certificate. One-year certificate courses vary in content according to the type of work chosen
- Child and youth care practitioners can obtain a basic National Association of Child Care Workers certificate
- Early childhood development practitioners have various qualification levels open to them
- **Responsible SETAs and other bodies**
- **HPCSA** – Health Professions Council of South Africa
- Various professional boards are associated with the HPCSA but operate almost independently. They cover such areas as: dietetics; optometry and dispensing opticians; radiography and clinical technology; medical and dental; medical technology; dental therapy and oral hygiene; emergency care; environmental health; occupational therapy, medical orthotics/prosthetics and arts therapy; physiotherapy, podiatry and biokinetics; psychology; speech, language and hearing professions.

Note: *Social workers also have to undergo intensive practical training, usually with various welfare organisations. To take up a position as a social worker, you need to register with the South African Council for Social Service Professions.*

Who will employ me?

Government departments; South African National Council for Child and Family Welfare; South African Federal Council on Disability; South African National Council for Alcoholism and Drug Dependence; Family and Marriage Society of South Africa; provincial hospitals; personnel departments of large commercial and industrial organisations; self-employment.

Where can I find out more?

South African Council for Social Service Professions (SACSSP); Health and Welfare Sector Education and Training Authority (HWSETA); Local Government, Water and related Services Sector Education and Training Authority (LGWSETA); Public Service Sector Education and Training Authority.

Soil Scientist

A soil scientist studies soil systems so that they can be managed. Soils are important in agriculture because they provide the food for plants to grow. Soils also help to lessen the effect of natural phenomena such as rain, and human activities such as pollution. Knowing about soils and how they function helps you to understand and manage broader environmental systems. As a soil scientist, you can specialise in different areas, such as the hydrology, chemistry, physics, biology, mineralogy, fertility, or decay of soils. You can expect to spend much of your working day outdoors and the rest of the time in a laboratory and an office.

Careers related to that of soil scientist include: water quality officer, agricultural scientist*, geotechnical engineer, environmental protection officer*, agricultural economist*, agricultural engineer*, and conservation officer.

What will I do in this career?

- Analyse soil for its chemical and mineral composition
- Classify soil according to types
- Experiment on soils to find out the best type of soil for different plants
- Investigate the effect of farming activities (e.g. tilling, fertilizing, and crop rotation) on different soil types
- Determine the effects of pollution and environmental factors on soils
- Work closely with other agricultural experts and farmers to improve soil management.

Qualifications and training

These include:

University degrees

- BAgric: Soil Science
- BSc: Soil Science

Graduate development programmes

- BSc (Hons): Soil Science
- BSc: Agriculture: Soil Science

Who will employ me?

CSIR; Agricultural Research Council; DWA; universities; fertilizer manufacturers; government departments; self-employment as a soil surveyor or analyst; construction industries; commercial banks; landscape architects.

Where can I find out more?

Agricultural Research Council; Institute for Soil, Climate and Water; Soil Science Society of South Africa; Fertiliser Society of South Africa; Primary Agriculture Education and Training Authority (PAETA); Chemical Industries Education and Training Authority (CHIETA).

Surveyor

Surveying or land surveying is the technique, profession, and science of accurately determining the three-dimensional position of points and the distances and angles between them. These points are usually on the Earth's surface and are often used to establish maps and boundaries. Surveying includes natural and man-made features and the sea.

Surveyors use elements of mathematics (geometry and trigonometry), physics, and engineering to achieve their objectives. Land surveying can include associated services such as mapping and related data accumulation, construction layout surveys, precision measurements of length, angle, elevation, area, and volume, as well as horizontal and vertical control surveys, and the analysis and utilization of land survey data.

As a surveyor you may spend a lot of time working outdoors, but you also work in offices analysing data and drawing up plans and reports.

After spending some years in the field, you may want to specialise as one of the following:

- **Hydrographic surveyor** – gathers information about rivers, harbours, waterways, and oceans. This information, such as the location of currents, shore lines, and lighthouses, is used by navigators and engineers
- **Land surveyor** – also called a cadastral surveyor marks the boundaries of properties and shows these on maps and plans
- **Engineering surveyor** – surveys routes for pipelines, sewers, tunnels, roads, and railways. You also carry out surveys on sites for engineering projects such as dams and construction as in multi-storey buildings, mapping the site, pegging it

out, and making sure that construction takes place within the right boundaries
- **Topographic surveyor** – measures and takes aerial photographs of the physical features of the Earth such as rivers, hills, and valleys in order to compile maps. In this field you also annotate aerial photographs to show topographical features
- **Geodetic surveyor** – accurately locates positions on the Earth's surface using signals from satellites (e.g. the global positioning system), the positions of stars, and electronic distance and levelling measurements. This information is used for global mapping and to monitor movements of the Earth's crust
- **Mine surveyor** – establishes the boundaries of mines and measures underground and opencast mine workings. These measurements allow connections to be made between underground passages and enable new mines to avoid older ones that might have flooded
- **Remote sensing surveyor** – monitors changes in the surface features of the Earth by using digital data from high-resolution satellites and other imagery systems in the sky.

You may also be interested in occupations that include civil engineer*, quantity surveyor, town and regional planner*, and cartographer*.

What will I do in this career?

- In the world of water, dam surveying and irrigation development
- Determine positions and heights through triangulation (measuring angles), traversing (pacing distances between two points), levelling (measuring heights), and aerial photographs
- Establish place names
- Interpret codes of practice and regulations
- Use computers to process information, draw maps and plans, and make calculations
- Make models using spatial data.

Qualifications and training

These include:

University degrees
- BSc: Land Surveying
- BTech: Surveying; Cartography

National certificates and national diplomas
- National Diploma: Hydrographic Surveying
- Certificate: Cartography
- National Certificate: Cartography
- National Diploma: Cartography
- National Higher Certificate: Cartography

Who will employ me?

Government departments such as Public Works, Land Affairs, Transport, and DWA; civil engineering firms; CSIR; Eskom; building contractors; private land surveying companies; Chief Directorate: Surveys and Mapping.

Where can I find out more?

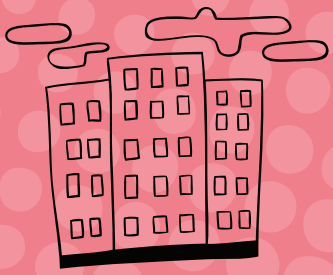
Chief Directorate: Surveys and Mapping; DWA; South African Council for Professional Land Surveyors; Construction Education and Training Authority (CETA).

Town and Regional Planner

Town and regional planners develop plans and policies for the use of resources and land and for improving people's living conditions. As a town and regional planner you are involved in large-scale projects such as new suburbs; town, commercial, and retail developments; transport links; urban renewal projects; and industrial areas. You would be assisted by town and regional planning technicians.

In any of these careers you spend time outdoors on field visits and indoors in meetings, writing reports, and doing research.

You can specialise as a: community town and regional planner; environmental planner (who investigates how human activities affect the natural environment); development planner (who plans for disadvantaged communities); urban planner; strategic planner; commercial and industrial planner; and residential planner. Other related occupations include architect, cartographer, surveyor*, civil engineer*, landscape architect, quantity surveyor, and property developer.



What will I do in this career?

- Estimate the future needs for housing, business and industrial sites, public facilities, open spaces, schools, cemeteries, traffic, and transportation
- Keep up with community development legal matters and changes to housing and building codes
- Survey and inspect sites
- Compile and analyse information about the physical, economic, legal, social, cultural, and environmental factors that affect land use
- Advise state or local government departments on planning issues
- Prepare rural and urban subdivision plans
- Prepare and coordinate economic, social, and environmental impact studies
- Consult with community groups and developers
- Present information in the form of maps, graphs, diagrams, sketches, and scale models.

Qualifications and training

(See also Surveyor above)
These include:

University degrees

- BA: Environmental Planning and Development
- BInstitutional Agric: Land-use Planning
- BTech: Town and Regional Planning
- BTown and Regional Planning
- BSc: Urban and Regional Planning

- BA(Hons): Urban Studies
- BUrban Development Studies Honours

National certificates and national diplomas

- National Diploma: Town and Regional Planning

Who will employ me?

Municipalities; provincial planning departments; property developers.

Where can I find out more?

South African Planning Institute; Construction Education and Training Authority (CETA).

Water Historian

Water is absolutely essential to human life and is a vital part of human history. Throughout history, people have usually settled near convenient sources of water. Most of the great ancient civilisations depended on a particular source of water. For example, the Egyptian civilisation developed along the banks of the Nile; Mesopotamia was situated between the Tigris and the Euphrates rivers; and Chinese civilisation began in the Yellow and Yangzi river basins.

Water was, and remains to this day, a vital means of transportation. The history of exploration and trade remains a major area of historical scholarship dealing with water. Some history scholarship focuses on the way in which a body of water links different areas and provides the backbone for a common culture.

Historically, water was an important source of power and kept the engines of the Industrial Revolution alive. Today, water remains an essential component in all kinds of manufacturing processes.

What will I do in this career?

The study of the history of water contributes to understanding of economic, political, social, and environmental history, the history of science, medicine, technology, environmental sciences, and geography. Water history links the humanities and social sciences, as well in as the natural and applied sciences; civil engineering; and hydrology.

If you are looking at this exciting, but still obscure field of study, there are two particular topics that you could consider: the improvement of water supplies and wastewater removal the construction of canals and dams. Other areas that are pertinent to South Africa are the history of water treatment and its development in South African towns and cities; mining practices that led to acid mine drainage; water pollution control; water management; and aquatic pollution.

Qualifications and training
These include:

University degrees
- BA: History
- BA(Hons): History

Who will employ me?
Universities; Water Research Commission; water utilities; government departments

Where can I find out more?
Universities; Water Research Commission, South African Historical Society

Welder

As a welder, you join pieces of metal by applying heat, pressure, or a combination of both. The most common types of welding in construction, manufacturing, and repairs are electric arc, resistance, and gas welding. Brazing, soldering, electron beams, and laser beams are other methods of joining metals. The joined pieces of metal are used in structures and equipment such as pipelines, turbines, nuclear reactors, pressure vessels, bridges, ships, vehicles, and domestic appliances. In a welding job you normally work in hot, smoky, often dirty places such as construction sites, factories, and shipyards.

With similar levels of qualifications, you could also become a boilermaker*; tool, jig, and die maker; blacksmith; plumber*; sheet metal worker; fitter and turner*; panel beater.

What will I do in this career?
- Construct and maintain metal equipment and structures
- Decide on the method of welding, the welding rod materials, and the treatments and tests to use after welding
- Identify welding electrodes and filler wire compositions
- Know how to store and dry electrodes and fluxes
- Recognize welding defects and fix them.

Qualifications and training
These include:

Learnerships
- Theoretical training – at a college or through a correspondence course
- Practical training – apprenticeship with an employer offering in-service training under a qualified tradesman or artisan
- Compulsory trade test – set by the Department of Labour, to qualify as an artisan.

Note: *If you want to become a welder, you should be at least 16 years old and have a grade 9 certificate.*

Who will employ me?

Eskom; gate and fence industry; motor manufacturing industry; railways; heavy and light engineering industries.

Where can I find out more?

Steel and Engineering Industries Federation (SEIFSA); SA Institute of Welding; Construction Education and Training Authority (CETA); Manufacturing, Engineering and Related Service Education and Training Authority (MERSETA).

Zoologist

Zoologists are biologists who study the structures, characteristics, functions, ecology, and environments of animals; the evolution of animal forms; and animal anatomy, physiology, embryology, behaviour, diseases, and geographical distribution. You may work as a researcher* at a university or research institute, as a laboratory* or fieldworker, in a museum, in education, or in wildlife management, conservation, agriculture, and medicine.

You would normally specialise in one area: e.g. cytology (cells); entomology (insects); parasitology (parasites); ethology (the behaviour of animals in their normal environments); ichthyology (fish); mammalogy (mammals); ornithology (birds); herpetology (reptiles). An ichthyologist, for instance, might examine fish to study the effects of pollution in dams, rivers, and oceans; a cytologist might work for a pharmaceutical company developing ways to fight waterborne diseases.

A zoologist has an important part to play in the world of water because the distribution of aquatic animals is an indication of the state of the environment.

You may conduct your research in laboratories, in libraries, and particularly in the habitat of the animal that you are studying. Your working hours can be irregular, and fieldwork can mean observing animals at all times of day for long stretches of time, keeping meticulous records, and living outdoors for extended periods. As a zoologist, you can also take up administrative positions in zoos or in museums.

What will I do in this career?

- Study the relationships between animals and their environment (in their natural surroundings, in captivity, and in laboratories), animal development, the way in which animals function, and the effect on them of human interference
- Identify species and collect data on growth, nutrition, reproduction, prey and predators

- Design methods of animal population control (e.g. of vermin and pests) and management in the wild and in captivity
- Conduct surveys of fauna
- Prepare laboratory reports, scientific papers, and reports for management agencies and other policy- and decision-makers
- Supervise the work of technical officers and technicians
- Give lectures.

Qualifications and training

These include:

University degrees

- BSc: Zoology
- BTech: Nature Conservation
- BSc(Hons): Zoology; Wildlife Science

National certificates and national diplomas

- Advanced Diploma: Nature Conservation
- Diploma: Nature Conservation
- National Certificate: Nature Conservation; Nature Conservation: Resource Guardianship
- National Diploma: Nature Conservation
- National Higher Certificate: Nature Conservation
- FET Certificate: Nature Conservation: Natural Resource Guardianship Terrestrial
- Postgraduate Diploma: Nature Conservation

Who will employ me?

Zoos, aquariums, national research institutes (e.g. example the Tick Research Institute, the Oceanographic Research Institute, Onderstepoort Veterinary Institution, and the National Collection for Insects); Department of Agriculture and DWA; museums; zoos; science councils, SANP and provincial nature conservation departments; private organizations such as game farms; fertilizer and insecticide manufacturers.

Where can I find out more?

Zoological Society of Southern Africa; Southern African Society of Aquatic Scientists; Southern African Institute of Ecologists; Local Government, Water, and related Services Sector Education and Training Authority (LGWSETA).

Section 3: Useful information and contacts

Note: *Details correct at time of going to press.*

For career advice, visit the South African Qualifications Authority's National Qualifications Framework and Career Advice helpline at www.careerhelp.org.za, call 086 0111673 or e-mail help@nqf.org.za.

NATIONAL SCARCE AND CRITICAL SKILLS LIST as it pertains, even periferally, to working with water

Chief executives, general managers and legislators
- Chief executives and managing directors
- General managers
- Senior government and local government officials
- Corporate (administration and business) services managers
- Finance managers and audit managers
- Policy and planning managers
- Research and development managers
- Programme and project managers
- Supply and distribution managers (including logistics managers)
- Specialist managers
- Construction, distribution and production/ operations managers
- Information and communications technology (ICT) managers
- Office and quality managers

Engineering professionals
- Chemical and materials engineers and technologists
- Civil engineers and technologists and quantity surveyors
- Electrical engineer and technologists
- Electronics and telecommunication engineers and technologists
- Industrial and mechanical engineers and technologists
- Mining engineers and technologists
- Miscellaneous engineering professionals including aeronautical and avionics engineers

Natural and physical science professionals
- Chemists
- Environmental scientists
- Geologists and geophysicists and earth science technologists
- Agriculture and forestry scientists
- Miscellaneous natural and physical science professionals

Business and systems analysts, and programmers
- ICT business and systems analysts
- Multimedia specialists and web developers
- Software and applications programmers

Database and systems administrators, and ICT security specialists
- Database and systems administrators
- ICT security specialists

ICT network and support professionals
- Computer network professionals
- ICT support and test engineers
- Telecommunications engineering professionals

Legal professionals
- Solicitors

General professionals
- Accountants, auditors and company secretaries
- Corporate treasurers
- Information and organisation professionals
- Air and marine transport professionals
- Actuaries
- Mathematicians and statisticians, economists

Technician and trades workers
- Agricultural, medical and science technicians
- Building and engineering technicians
- ICT and telecommunications technicians
- Manufacturing and process technicians
- Mechanical engineering technicians
- Plumbers
- Electro technology and telecommunications trades workers
- Electricians

- Electronics and telecommunications trades workers

Clerical and administrative workers
- Contract, programme, project and office administrators
- Personal assistants and scretaries
- General clerical workers
- Accounting clerks and bookkeepers

Elementary workers
- Construction and mining workers
- Factory process workers
- Farm, forestry and garden workers

NATIONAL SCARCE AND CRITICAL SKILLS LIST CONTACTS

- https//www.labour.gov.za/downloads/documents/useful-documents/skills-development-act/Scarce%20skills%20pamphlet_pamphlet.pdf
- http://www.agriseta.co.za/downloads/S&C_Skills_List_Nov_2010.pdf (2011-2016 (Baseline and Projections).
- http://www.eseta.org.za/Documents/OFO%20Version%2010.pdf The Organising Framework of Occupations (OFO Codes)
- http://www.wrseta.org.za/downloads/Scarce_critical_skills_list_2012_Update.pdf

DEPARTMENT OF LABOUR CONTACT DETAILS

Provincial Offices of the Department of Labour

Eastern Cape	
East London	Tel: 043 701-3000
Free State	
Bloemfontein	Tel: 051 505-6200
Gauteng North	
Pretoria	Tel: 012 309-5000
Gauteng South	
Johannesburg	Tel: 011 853-0300
KwaZulu-Natal	
Durban	Tel: 031 366-2000
Limpopo	
Polokwane	Tel: 015 290-1744
Mpumalanga	
Witbank	Tel: 013 655-8700
North West	
Mmabatho	Tel: 018 387-8100
Northern Cape	
Kimberley	Tel: 053 838-1500
Western Cape	
Cape Town	Tel: 021 441-8000

Labour Centres of the Department Of Labour

Eastern Cape	
Aliwal North	Tel: 051 633-2633
Butterworth	Tel: 047 491-0656
Cradock	Tel: 048 881-3010
East London	Tel: 043 702-7500
Fort Beaufort	Tel: 046 645-4686
Graaf-Reinet	Tel: 049 892-2142
Grahamstown	Tel: 046 622-2104
King William's Town	Tel: 043 643-4756
Lusikisiki	Tel: 039 253-1996
Maclear	Tel: 045 932-1424
Mdantsane	Tel: 043 761-3151
Mount Ayliff	Tel: 039 254-0282
Mthatha	Tel: 047 501-5600
Port Elizabeth	Tel: 041 582-4472
Queenstown	Tel: 045 807-5400
Uitenhage	Tel: 041 992-4627
Free State	
Bethlehem	Tel: 058 303-5293
Bloemfontein	Tel: 051 505-6201
Botshabelo	Tel: 051 534-3789
Ficksburg	Tel: 051 933-2299
Harrismith	Tel: 058 623-2977
Kroonstad	Tel: 056 215-1812
Petrusburg	Tel: 053 574-0932
Phuthaditjhaba	Tel: 058 713-0373
Sasolburg	Tel: 016 970-3200
Welkom	Tel: 057 391-0200
Zastron	Tel: 051 673-1471
Gauteng North	
Atteridgeville	Tel: 012 373-4435
Bronkhorstspruit	Tel: 013 932-0197
Garankuwa	Tel: 012 702-4525
Krugersdorp	Tel: 011 955-4420
Mamelodi	Tel: 012 812-9500
Pretoria	Tel: 012 309-5050
Randfontein	Tel: 011 693-3618
Soshanguve	Tel: 012 799-7400
Temba	Tel: 071 871-6509
Gauteng South	
Alberton	Tel: 011 861-6130
Benoni	Tel: 011 747-9601

Boksburg	Tel: 011 898-3340
Brakpan	Tel: 011 744-9000
Carletonville	Tel: 018 788-3281
Germiston	Tel: 011 345-6300
Johannesburg	Tel: 011 223-1000
Kempton Park	Tel: 011 975-9301
Nigel	Tel: 011 814-7095
Randburg	Tel: 011 781-8144
Roodepoort	Tel: 011 766-2000
Sandton	Tel: 011 444-7631
Sebokeng	Tel: 016 592-3825
Soweto	Tel: 011 939-1200
Springs	Tel: 011 365-3700
Vanderbijlpark	Tel: 016 981-0280
Vereeniging	Tel: 016 430-0000
KwaZulu-Natal	
Dundee	Tel: 034 212-3147
Durban	Tel: 031 336-1500
Estcourt	Tel: 036 352-2161
Kokstad	Tel: 039 727-2140
Ladysmith	Tel: 036 638-1900
Newcastle	Tel: 034 312-6038
Pietermaritzburg	Tel: 033 341-5300
Pinetown	Tel: 031 701-7740
Port Shepstone	Tel: 039 682-2406
Prospecton	Tel: 031 913-9700
Richards Bay	Tel: 035 780-8700
Richmond	Tel: 033 212-2768
Stanger	Tel: 032 551-4291
Ulundi	Tel: 035 879-1439
Verulam	Tel: 032 541-5600
Vryheid	Tel: 034 980-8992
Limpopo	
Giyani	Tel: 015 812-9041
Jane Furse	Tel: 013 265-7210
Lebowakgomo	Tel: 015 633-9360
Lephalale	Tel: 014 763-2162
Makhado	Tel: 015 516-0207
Modimolle	Tel: 014 717-1046
Mokopani	Tel: 015 491-5973
Phalaborwa	Tel: 015 781-5114
Polokwane	Tel: 015 299-5000
Seshego	Tel: 015 223-7020
Thohoyandou	Tel: 015 960-1300
Tzaneen	Tel: 015 306-2600
Mpumalanga	
Baberton	Tel: 013 712-3066
Bethal	Tel: 017 647-5212
Carolina	Tel: 017 843-1077
Eerstehoek	Tel: 017 883-2414
eMalahleni/ Witbank	Tel: 013 653-3800
Ermelo	Tel: 017 819-7632
Groblersdal	Tel: 013 262-3150
Kwamhlanga	Tel: 013 947-3173
KaMhlushwa	Tel: 013 785-0010
Lydenburg	Tel: 013 235-2368
Middelburg	Tel: 013 283-3600
Nelspruit	Tel: 013 753-2844
Piet Retief	Tel: 017 826-1883
Sabie	Tel: 013 764-2105
Secunda	Tel: 017 631-2594
Standerton	Tel: 017 712-1351
Volksrust	Tel: 017 735-2994
Northern Cape	
Calvinia	Tel: 027 341-1280
De Aar	Tel: 053 631-0952
Kimberley	Tel: 053 838-1500
Kuruman	Tel: 053 712-3952
Postmasburg	Tel: 053 313-0641
Springbok	Tel: 027 718-1058
Upington	Tel: 054 331-1752
North West	
Brits	Tel: 012 252-3068
Christiana	Tel: 053 441-2120
Klerksdorp	Tel: 018 464-8700
Lichtenburg	Tel: 018 632-4323
Mafikeng	Tel: 018 381-1010
Mogwase	Tel: 014 555-5693
Potchefstroom	Tel: 018 297-5100
Rustenburg	Tel: 014 592-8214
Taung	Tel: 053 994-1710
Vryburg	Tel: 053 927-5221
Western Cape	
Beaufort West	Tel: 023 414-3427
Bellville	Tel: 021 941-7000
Cape Town	Tel: 021 468-5500
George	Tel: 044 801-1201
Knysna	Tel: 044 382-3150
Mitchell's Plain	Tel: 021 391-0591
Mossel Bay	Tel: 044 691-1140
Oudtshoorn	Tel: 044 272 4370
Paarl	Tel: 021 872-2020
Somerset West	Tel: 021 852-2535
Vredenburg	Tel: 022 715-1627
Worcester	Tel: 023 347-0152

Section 4: Academic Contacts

Note: *Details correct at time of going to press*

UNIVERSITIES

Nelson Mandela Metropolitan University
PO Box 77000
Port Elizabeth, 6031
Tel: 041 504-2111 / Fax: 041 504-257/2731
Email: info@nmmu.ac.za

NMMU – Nelson Mandela Metropolitan University
@NMMU4U
NMMUonTube
www.nmmu.ac.za

NMMU – George Campus
Tel: 044 801-5111

North West University
Mafikeng Campus
Tel: 018 389-2111 / Fax: 018 392-5775
Toll Free: 0800 623 698

NWU Mafikeng Campus
@NWUMafikeng
http://www.nwu.ac.za/node/2811

Potchefstroom Campus
Tel: 018 299-1111/2222 / Fax: 018 299-2767

NWU-Pukke
@NWUPuk
North West University Potchefstroom Camp
NWU Pukke
nwupuk.mobi
NWU-PUKKEtv
www.nwu.ac.za/pc/index.html

Vaal Triangle Campus
Tel: 016 910-3111 / Fax: 016 910-3116

NWU Vaal Triangle Campus
@vaalNWU
www.nwu.ac.za

Rhodes University
PO Box 94
Grahamstown, 6140
Tel: 046 603-8111 / Fax: 046 603-7350
Email: registrar@ru.ac.za

Rhodes University
@RhodesUnivesity
Rhodes University
Rhodes University Alumni
www.ru.ac.za

Stellenbosch University
Private Bag X1
Matieland, 7602
Tel: 021 808-9111 / Fax: 021 808-3822
Email: info@sun.ac.za

Stellenbosch University
@StellenboschUni
Stellenbosch University
www.sun.ac.za

University of Cape Town
Private Bag X3
Rondebosch, 7701
Tel: 021 650-9111 / Fax: 021 650-3726
Email: admissions@uct.ac.za

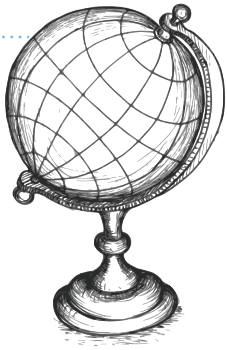
University of Cape Town
@UCT_news
University of Cape Town
universityofcapetown
www.uct.ac.za

University of Fort Hare
Alice Campus
Tel: 040 602-2011 / Fax: 040 653-1554
Bisho Campus
Tel: 040 608-3407 / Fax: 040 608-3408
East London Campus
Tel: 043 704-7000 / Fax: 043 704-7095

University of Fort Hare
@ufh1916 (University_Fort Hare)
University of Fort Hare
www.ufh.ac.za

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

University of the Free State



@UFSweb (UFS/UV)
University of the Free State
UFSWeb's channel
www.ufs.ac.za

University of Johannesburg

PO Box 524
Auckland Park, 2006
Tel: 011 559-4555

University of Johannesburg
@mediauj (UJ News)
University of Johannesburg
www.uj.mobi
www.uj.ac.za

University of KwaZulu-Natal

University of KwaZulu-Natal
Durban, 4041
Tel: 031 260-1111
Email: enquiries@ukzn.ac.za

University of KwaZulu-Natal
@UKZN
University of KwaZulu-Natal
www.ukzn.ac.za

University of Limpopo

Turfloop Campus
Private Bag X1106
Sovenga, 0727
Tel: 015 268-3332 / Fax: 015 267- 0152 / 268- 3118

Medunsa Campus/Ga-Rankuwa Campus
Tel: 012 521-4979 / 4058 / 4319 /4345
Fax: 012 521-5732
Email: medicalschool@ul.ac.za

UL Campus
University of Limpopo
@ULSite
www.ul.ac.za

University of Pretoria

Private bag X20
Hatfield, 0028
Tel: 012 420-3111 / Fax: 012 420-4555
Email: csc@up.ac.za

University of Pretoria
@UPTuks (Uni. Of Pretoria)
UPvideolibrary
www.up.ac.za

University of South Africa

PO Box 392
Unisa, 0003
Tel: 012 441-5811/5792/61/93/94/95
Fax: 012 429-4150
Email: gautengtl@unisa.ac.za

Students may send an SMS to 32695 for more information on how to contact Unisa via SMS. The sender will receive an auto response SMS with the various SMS options. The cost per SMS is R1.00
Email: info@unisa.ac.za

Unisa – The University of South Africa
@unisa
University of South Africa
mobi.unisa.ac.za
www.unisa.ac.za

University of Venda

Private Bag X5050
Thohoyandou, 0950
Tel: 015 962-8000 / Fax: 015 962-4749
Email: registrar@univen.ac.za

University Of Venda
@Univenofficial
University of Venda
www.univen.ac.za

University of the Western Cape

Private Bag X17
Bellville, 7535
Robert Sobukwe Road
Bellville, 7535
Tel: 021 959-2911
Email: info@uwc.ac.za

UWC Online
@UWConline
University of the Western Cape
UWCPhotoOnline
UWCOnline
www.uwc.ac.za

University of the Witwatersrand

Private Bag 3, Wits 2050
1 Jan Smuts Ave, Braamfontein
Johannesburg, 2001
Tel: 011 717-1000
Email: webmaster@wits.ac.za

Wits University - Wits University
@WitsUniversity

University of the Witwatersrand
www.wits.ac.za

University of Zululand
Private Bag X1001
KwaDlangezwa
3886
Tel: 035 902-6000

University Of Zululand
www.uzulu.ac.za

UNIVERSITIES OF TECHNOLOGY

Cape Peninsula University of Technology
PO Box 652
Cape Town, 8000
Keizersgracht and Tennant Street
Zonnebloem
Tel: 021 959-6767
Email: info@cput.ac.za

Cape Peninsula University of Technology (CPUT)
@CPUT
CPUT
Cape Peninsula University of Technology
www.cput.ac.za

Central University of Technology
Private Bag X20539
Bloemfontein, 9300
Tel: 051 507-3911

Welkom Campus
Tel: 057 910-3500

NIHE: Kimberley
Tel: 053 836-5960
Email: Kimberl@cut.ac.za

Central University of Technology, Free State (CUT)
@cutfsonline
www.cut.ac.za

Durban University of Technology
PO Box 1334
Durban, 4000
70 Mansfield Road
Berea, 4001
Tel: 086 010-3194
Email: info@dut.ac.za

Durban University of Technology
@DUT_Tweets
DutCampusTv
www.dut.ac.za

Mangosuthu University of Technology
PO Box 12363
Jacobs, 4026
511 Mangosuthu Highway
Umlazi
KwaZulu-Natal, 4031
Tel: 031 907-7111

Mangosuthu University of Technology
@MUT_Umlazi
Mangosuthu University of Technology
www.mut.ac.za

Tshwane University of Technology
Private Bag X680
Pretoria, 0001
Tel: 086 110-2421 / Fax: 012 382-5114
Email: general@tut.ac.za

Ga-Rankuwa Campus
Private Bag X680
Pretoria 0001
Tel: 012 382-0711 / Fax: 012 382-1166

Polokwane Campus
Private Bag X9496
Polokwane 0700
109 Market Street
Tel: 015 287-0700 / Fax: 015 297-7609

Arts Campus
Tel: 012 382-6175 / Fax: 012 382-6175
Private Bag X680
Pretoria 0001
Corner of Du Toit and Struben Streets

Soshanguve Campus
Private Bag X680
Pretoria 0001
Tel: 012 382-9000 / Fax: 012 382-0966

eMalahleni Campus
PO Box 3211
eMalahleni 1035
Corner of Swartbos and President Streets
Tel: 013 653-3100 / Fax: 013 653-3164

Nelspruit Campus
Private Bag X11312
Nelspruit 1200
Tel: 013 745-3500 / Fax: 013 745-3512

Arcadia Campus
Private Bag X680
Pretoria 0001
Nelson Mandela Drive
Tel: 012 382-5911 / Fax: 012 382-6210

Tshwane University of Technology
@TutInspired
www.tut.ac.za

Vaal University of Technology
Private Bag X021,
Vanderbijlpark, 1900
Andries Potgieter Boulevard
Vanderbijlpark
Tel: 016 950-9924/5 /9922/9311
Fax: 016 950-9775 or 016 950-9731
Email: reception@vut.ac.za

Vaal-University-of-Technology
www.vut.ac.za

Educity (Sebokeng Campus)
Former VISTA University
cnr Old Potchefstroom and
Vereeniging Main Road
Sebokeng

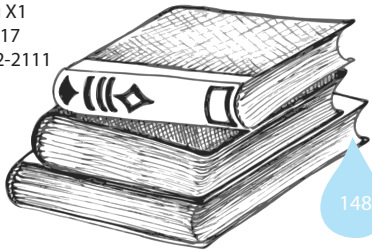
Ekurhuleni Campus
Process House
24 Plane Road
Spartan Ext 1
Tel: 011 929-7400 / Fax: 011 392-1249

Secunda Campus
8 Carl Bosch Street
Secunda
Tel: 0 17 631-1971 / Fax: 017 631-2328

Klerksdorp Campus
Corner Magaretha Prinsloo and
Corrie De Kock Streets
Klerksdorp
Tel: 018 462-9268 / Fax: 018 462-2517

Upington Campus
Roman Catholic Church
Le Roux Street
Upington
Tel: 054 332-3304 / Fax: 054 332-3634

Walter Sisulu University for Technology and Science
Private Bag X1
UNITRA, 5117
Tel: 047 502-2111



Butterworth Campus
Tel: 047 401-6277

Queenstown Campus
Tel: 045 838-2598

Mthatha Campus
Tel: 047 502 2438/501-1400

Buffalo City
Tel: 043 708-5245/043 709-4000

Walter Sisulu University
www.wsu.ac.za

FURTHER EDUCATION AND TRAINING COLLEGES

Further Education and Training Colleges
Grand Central Towers
Parliament Street
Cape Town, 8000
Tel: 021 467-2614

www.fetcolleges.co.za

Eastern Cape

Buffalo City FET College (East London)
Cnr Lukin Road and King Street
Selbourne
East London, 5201
Tel: 043 709-9201
Email: information@bccollege.co.za

Buffalo City Public FET College
www.bccollege.co.za

Campus information:

East London Campus
Tel: 043 722-5453
Email: information@bccollege.co.za

John Knox Bokwe Campus
Tel: 043 761-1792
Email: jkbadmin@bccollege.co.za

St Marks Campus
Tel: 043 743-6554
Email: training@bccollege.co.za

East Cape Midlands FET College (Uitenhage)
Cnr Cuyler and Durban Street
Uitenhage Central
Uitenhage, 6229
Tel: 041 995-2000
Email: info@emcol.co.za

Eastcape Midlands College
www.emcol.co.za

Campus information:

Charles Goodyear Campus
Tel: 041 922-7258
Graaf-Reinet Campus
Tel: 049 891-0201 / Fax: 049 891-0181
Grahamstown Campus
Tel: 046 636-1575 / Fax: 046 636-1823
High Street Campus
Tel: 041 992-5929
Park Avenue Campus
Tel: 041 995-2000

Ikhala FET College (Queenstown)

PO Box 71
Queenstown, 5320
Tel: 045 838-2593 / Fax: 045 838-1406
Email: queenstown@ikhalacollege.org.za

ikhala FET college QUEENSTOWN

Campus information:

Aliwal North Campus
Tel: 051-634-1035 / Fax: 051 633-3560
Email: aliwal@ikhalacollege.org.za
Cradock Campus
Tel: 048 881-1723
Email: Cradock@ikhalacollege.org.za
Ezibeleni Engineering Campus
Tel: 047 873-1293 / Fax: 047 873-3324
Queen Nonesi Campus – Lady Frere
Tel: 047 878-6472 / Fax: 086 544-3704
Queenstown Campus
Tel: 045 838-2593/4 / Fax: 045 838-1406
Sterkspruit Campus
Tel: 051 611-0205 / Fax: 051 611-0298

Ingwe FET College (Mount Frere)

Cancele Road
Mount Frere
Eastern Cape, 5090
Tel: 039 255 0346/1204

Ingwe fet college mount frere

Campus information:

Maluti Mgoboza Campus
Tel: 039 256-0607
Mount Fletcher Campus
Tel: 039 257-0991
Mount Frere Campus
Tel: 039 255-0532
Ngqungqushe Campus
Tel: 039 253-1059
Siteto Campus
Tel: 039 251-3068

King Hintsa FET College (Butterworth)

Centane Road
Butterworth
Eastern Cape
Tel: 047 491 3722
Email: teki@kinghintsafetcollege.org.za

Campus information:

Centane Campus
Tel: 047 498-6425
HB Tsengwa Campus
Tel: 047 499-1234

King Sabata Dalindyebo FET College (Umtata)

R61 Queenstown Road
Cicira Village
Mthatha, 5099
Tel: 047 505-1000 / Fax: 047 536-0932
Email: jola@ksdfetcollege.org.za

http://ksdfetcollege.co.za

Campus information:

Ngcobo Campus
Tel: 047 548-1467
Mapuzi Campus
Tel: 047 575-9044
Mngazi Campus
Tel: 072 070-2651
Mthatha Campus
Tel: 047 5360 923
Ntabozuko Campus
Tel: 047 576-9069

Lovedale FET College (King William's Town)

1 Amatoloa Row
King William's Town
Tel: 043 604-0700 / Fax: 043 642-1388

www.lovedalecollege.co.za

Campus information:

Alice Campus
Tel: 040 653 1171 / Fax: 040 653-1073
King Williams Town Campus
Tel: 043 604-0705 / Fax: 043 643-3838

Zwelitsha Campus
Tel: 040 654-1516/38 / Fax: 040 654-3161

Port Elizabeth FET College
139 Russell road
Central Port Elizabeth
Tel: 041 585-7771
Email: info@pecollege.edu.za

www.pecollege.edu.za

Campus information:

Algoa Campus – Stuandale
Tel: 041 401-3800 / Fax: 041 401-3817
Dower Campus – Bethelsdorp
Tel: 041 481-2171 / Fax: 041 481-7111
Erica Campus – Richmond Hill
Tel: 041 585 7771 / Fax: 086 633-7108
Iqhayiya Campus – Stuandale
Tel: 041 401-3800 / Fax: 041 401-3817
Russell Road Campus
Tel: 041 585 7771 / Fax: 041 585-5436
Victoria Campus
Tel: 041 373-6813 / Fax: 041 374-5321

Free State

Flavius Mareka FET College (Sasolburg)
Cnr Hertzog Road and Fraser Street
Sasolburg, 1947
Tel: 016 976 0815/29

Flavius Mareka FET College
www.flaviusmareka.net

Campus information:

Kroonstad Campus
Tel: 056 212-5157/8 / Fax: 056 212-7815
Mphohadi Campus
Tel: 056 214-1111/1341 / Fax: 056 214-2691
Sasolburg Campus
Tel: 016 976-0829/0815 / Fax: 016 973-1618

Goldfields FET College (Welkom)
Tel: 057 910-6000 / Fax: 057 392-1082
Email: admin@gfc.za.net

Goldfields Fet College
@GoldfieldsFET
http://gfc.za.net/GFET

Campus information:

Tosa Campus
Tel: 057 395-1301 / Fax: 057 395-1304
Welkom Campus
Tel: 057 391-0500 / Fax: 057 353-2298

Maluti FET College (Witsieshoek)
Private Bag X870
Witsieshoek, 9870
Tel: 058 713-6100 / Fax: 058 713-649

www.malutifet.org

Campus information:

Bethlehem Campus
Tel: 058 303-3377 / Fax: 058 303-7306
Bonamelo Campus
Tel: 058 713-1391 / Fax: 058 713-5388
Harrismith Campus
Tel: 058 622-2785/2572/3626
Itemoheleng Campus
Tel: 058 713-0296 / Fax: 058 713-5007
Kwethisong Campus
Tel/Fax: 058 713-1330
Lere la Tshepe Campus
Tel: 058 713-0031 / Fax: 058 713-6611
Main Campus
Tel: 058 713-0612 / Fax: 058 713-5638
Sefikeng Campus
Tel: 058 713-6053 / Fax: 058 713-4722

Motheo FET College (Bloemfontein)
Cnr St Georges and Aliwal Streets
Bloemfontein, 9301
Tel: 051 406-9300 / Fax: 051 406-9434
Email: marketing@motheofet.co.za

Mothelo FET College
@MotheoCollege
www.motheofet.co.za

Campus information:

Bloemfontein Campus
Tel: 051 406-9302
Botshabelo Campus
Tel: 083 513-9299 (Mr Mophiring)
Hillside View Campus
Tel: 051 409-3300
Koffiefontein Rural Campus
Tel: 083 641-2425 (Mr Koba)
Thaba 'Nchu Campus
Tel: 087 941-6843

Gauteng

Central Johannesburg FET College (Parktown)
5 Ubla Avenue
Off Princess of Wales Terrace
Parktown
Tel: 011 351-6000/1 / Fax: 011 484-2738
Email: info@cjc.co.za

Central Johannesburg College
www.cjc.co.za

Campus information:

Parktown Campus
Tel: 011 643-8421 / Fax: 011 643-1020
Alexandra Campus
Tel: 011 882-9763 / Fax: 011 882-3305
Ellis Park Campus
Tel: 011 402-2990 / Fax: 011 402-2991
Crown Mines Campus
Tel: 011 247-0913 / Fax: 011 247-0916
Riverlea Campus
Tel: 011 474-2080 / Fax: 011 473-2321
Langlaagte Campus
Tel: 011 839-2781 / Fax: 011 839-3972
Troyville ICT Learning Resource Centre
Tel: 011 216-0300 / Fax: 011 216-0301

Ekurhuleni East FET College (Springs)
Sam Ngema Road
Kwa-Thema
Springs, 1560
Tel: 011 730-6600 / Fax: 011 736-1489
Email: info@eec.edu.za

Ekurhuleni East College
@EECFET
www.eec.edu.za

Campus information:

Kwa-Thema Campus
Tel: 011 730-6600 / Fax: 011 736-6408
Springs Campus
Tel: 011 730-6600 / Fax: 011 362-612
Benoni Campus
Tel: 011 730-6600 / Fax: 011 42-3436
Daveyton Campus
Tel: 011 730-6600 / Fax: 011 426-4091
Brakpan Campus
Tel: 011 730-6600 / Fax: 011 740-9188

Ekurhuleni West FET College (Germiston)
Cnr Driehoek and Sol Roads
Germiston, 1400
Tel: 011 323-1600 ext 205/55/53
Call Center: 0861 392-111
Fax: 011 972-3615
Email: info@ewc.edu.za

Ekurhuleni West College for FET
@ewc_info
www.ewc.edu.za

Campus information:

Alberton Campus
Tel: 011 900-1201/2 / Fax: 011 900-1712
Boksburg Campus
Tel: 011 917-9984 / Fax: 011 917-8770
Germiston Campus
Tel: 011 872-0830 / Fax: 011 873-1769
Kathorus Campus
Tel: 011 905-3562/3531 / Fax: 011 905-3644
Kempton Campus
Tel: 011 972-4247 / Fax: 011 391-1582
Tembisa Campus
Tel: 011 925-1005/6; 071 389-4006; 079 972-9534
Fax: 011 925-1023

Sedibeng College (Vereeniging)
37 Voortrekker Street
Vereeniging
Tel: 016 422-6645 / Fax: 016 422-6646
Email: info@sedcol.co.za

www.sedcol.co.za

Campus information:

Heidelberg Campus
Tel: 016 349-1022/33 / Fax: 016 349-1044
Sebokeng Campus
Tel: 016 595-1100 / Fax: 016 988-1288
Vanderbijlpark Campus
Tel: 016 933-5644 / Fax: 016 931-9406
Vereeniging Campus
Tel: 016 421-1150 / Fax: 016 422-0746

South West Gauteng College (Soweto)
1822 A Molele Street
Cnr Kom Road
Malapo Soweto
Tel: 086 176-8849 / Fax: 011 974-126
Email: headoffice@swgc.co.za

South West Gauteng Swgc
@SWGCollege
www.swgc.co.za

Campus information:

Dobsonville Campus
Tel: 086 176-8849 / Fax: 011 988-9212
Email: dobson@swgc.co.za
George Tabor Campus
Tel: 086 176-8849 / Fax: 011 982-5543
Email: gtabor@swgc.co.zao@swgc.co.za
Molapo Campus
Tel: 086 176-8849 / Fax: 011 984 -0136
Email: molapo@swgc.co.za
Roodepoort Campus
Tel: 086 176-8849 / Fax: 011 763-5937
Email rdp@swgc.co.za
Roodepoort West Campus
Tel: 086 176-8849 / Fax: 011 766-4212
Email: rdpw@swgc.co.za
Technisa Campus
Tel: 086 176-8849 / Fax: 011 886-7718
Email: tech@swgc.co.za

Tshwane North College (Pretoria)

Cnr Potgieter and Pretrious Streets
Pretoria
Tel: 012 401-1600/1999 / Fax: 012 323-8683
Email: info@tnc4fet.co.za

@TSC4FET
www.tnc4fet.co.za

Campus information:

Central Office
Tel: 012 401 1600 / Fax: 012 323-8683
Email: central@tnc4fet.co.za
Pretoria Campus and TNC Marketing
Tel: 012 401-1600 / Fax: 012 326-5298
Mamelodi Campus
Tel: 012 801-1010/401-1860 / Fax: 012 801-1179
Rosslyn Campus
Tel: 012 541-1590/401-1920 / Fax: 012 541-1398
Soshanguve North Campus
Tel: 012 797-2041/401-1818 / Fax: 012 799-1858
Soshanguve South Campus
Tel: 012 793 1208/9
Temba Campus
Tel: 012 793-2675/401-1818 / Fax: 012 793-1383

Tshwane South College (Centurion)

85 Francis Baard (formally known as
Schoeman Street)
Tel: 086 144-1111
Email: info@tsc.edu.za

Tshwane South College for FET
@TSC4FET
www.tsc.edu.za

Campus information:

Atteridgeville Campus
Tel: 012 373-8030/1 / Fax: 012 373-8032
Email: ivys@tsc.edu.za
Centurion Campus
Tel: 012 660-8500 / Fax: 012 664-8358
Email: centsec@tsc.edu.za
Odi Campus
Tel: 012 725-1800
Fax: 012 702-5752/3387
Email: norman@tsc.edu.za
Pretoria West Campus
Tel: 012 380-5000 / Fax: 012 386-1245
Email: bongi@tsc.edu.za

Western College for FET (Randfontein)

42 Johnstone Street
Randfontein
Tel: 011 692-4004 / Fax: 011 692-2880
Email: info@westcol.co.za

www.westcol.co.za

Campus information:

Randfontein Campus
Tel: 011 693-3608/9
Kurgersdorp Campus
Tel: 011 953-1140
Krugersdorp West Campus
Tel: 011 660 1709
Randfontein Campus
Tel: 011 693-3608/9
Carletonville
Tel: 018 787-4102
Thuba Makote (Magaliesburg)
Tel: 014 557-2671
Amandelbult
Tel: 014 784-1407

KwaZulu-Natal

Coastal KZN FET College

PO Box 1795
Amanzimtoti, 4126
Tel: 031 905 7000/1 / Fax: 031 905-1399
Email: CAO.ckzcao@feta.go.za

www.coastalkzn.co.za

Campus information:

Durban Campus
Tel: 031 206-0616/7/8 / Fax: 031 206-0945
Email: Durban.ckzdur@feta.gov.za

Coastal KZN FET College Durban Campus
Coastal KZN FET College @ Durban Campus

Swinton Road Campus
Tel: 031 462-2333 / Fax: 031 462-3230
Email: Swinton.ckzswr@feta.gov.za

Coastal KZN FET College (Swinton campus)

Umbumbulu Campus (Kwamakhutha)
Tel: 031 905-7200 / Fax: 031 905-1472
Email: Umbumbulu.ckzbul@feta.gov.za

Umlazi-V Campus
Tel: 031 907-2666/72/76 / Fax: 031 907-2679
Email: Umlazi-v.ckzumv@feta.gov.za

coastal kzn fet college umlazi v-campus
Coastal KZN FET Umlazi V Campus

Umlazi-BB Campus
Tel: 031 909-3800/11 / Fax: 031 909-4944
Email: Umlazi-bb.ckzubb@feta.gov.za

As-Salaam Satellite Campus
Tel: 039 971-1087 / Fax: 039 971-1712
Email: majamse.ckzassalaam@webmail.co.za

Ubuhle Bogu Campus Kwaqiko
Tel: 039 971-9068 / Fax: 039 971-9075
Email: mazibukov.ckzcao@feta.gov.za

Appelsbosch Campus (Ozwatini)
Tel: 032 294-8400
Email: gwalal.ckzcao@feta.gov.za

Elangeni FET College (Pinetown)

Private Bag X9032
Pinetown, 3610
Tel: 031 716-6700 / Fax: 031 716-6777
Email: info.elangeni@feta.gov.a
Blog: http://elangenicollege.wordpress.com

Elangeni college
@elangenicollege
Elangeni College
www.efet.co.za

Campus information:

Inanda Campus
Tel: 031 519-0933

KwaDabeka Campus
Tel: 031 711-0313

KwaMashu Campus
Tel: 031 503-9708

Mpumalanga Campus
Tel: 031 771-0148

Ndwedwe Campus
Tel: 031 532-1519

Ntuzuma Campus
Tel: 031 509-1924

Pinetown Campus
Tel: 031 702-3260

Qadi Campus
Tel: 031 777-1742

Esayidi FET College (Port Shepstone)

Lot 462, Nelson Mandela Drive
Port Shepstone, 4240
Tel: 039 684-0110 / Fax: 039 684-0280
Email: info@easyidifet.co.za

http://esayidifet.co.za

Campus information:

Enyenyezi Campus (Boboyi)
Tel: 039 685-5482/3 / Fax: 039 625-4135

Gamalakhe Campus
Tel: 039 318-1092 / Fax: 039 318-1184

Esayidi FET College-Gamalakhe Campus

Kokstad Campus
Tel: 039 792-3062 / Fax: 086 549-3853

Nqumuza Campus
Tel: 039 319 1825

Port Shepstone Campus (Oslo Beach)
Tel: 039 685-4824/5 / Fax: 039 685-4848

Umzimkulu Campus
Tel: 074 126-4640 / Fax: 086 540-0118

Esayidi FET College (uMzimkhulu Campus)

Majuba FET College (Newcastle)

83 Allen Street
Newcastle, 2940
Tel: 034 326-4888 / Fax: 034 326-4889

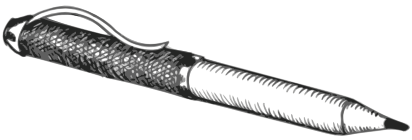
Majuba FET College
Majuba fet college
www.majuba.edu.za

Campus information:

Centre for People Development Campus
Tel: 034 329 2004 / Fax: 034 329-2538

Dundee Campus
Tel: 034 212-5132 / Fax: 034 212-5739

Information Technology and Business Campus
Tel: 034 318-1206 / Fax: 034 318-1262



Majuba Technology Centre
Tel: 034 329-1182/3/5 / Fax: 034 329-2580
Newcastle Technology Campus
Tel: 034 318-3041 / Fax: 034 318-3044
Newcastle Training Centre
Tel: 034 318-2021 / Fax: 034 318-1574
Open Learning Unit
Tel: 034 318-2081

Mnambithi FET College (Ladysmith)

Private Bag X9903
Ladysmith, 3370
Tel: 036 638-3800 / Fax: 036 631-4146
Email: sifiso@mfet.co.za or chettyd.mnacao@feta.gov.za

Campus information:

Estcourt
Tel: 036 342-9800
Ezakheni E-Section Campus
Tel: 036 634-1020
Mnambithi FET College (Ezakheni Campus)
Ezakheni A-Section
Tel: 036 363-2733
Mnambithi FET College, Ezakheni A Campus
Ladysmith Campus
Tel: 036 637-4782
Mnambithi FET College – Ladysmith Campus

Mthashana FET College (Vryheid)

266 South Street
Vryheid, 3100
Tel: 034 980 1010 / Fax: 034 980-1012
Email: info@mthashanafet.co.za
http://mthashanafet.co.za

Campus information:

eMamanleni Campus
Tel: 035 879-1061 / Fax: 035 879-1652
Maputa Campus
Tel: 078 801-9038
Nongoma Campus
Tel: 035 831-3202
Nquthu Campus
Tel: 034 271-0337
Vryheid Campus
Tel: 034 980-5337 / Fax: 034 980-7918
Babanango Campus
Tel: 035 835-0200

Umfolozi FET College (Richards Bay)

Private Bag X5023
Richards Bay, 3900
Tel: 035 902-9501 / Fax: 035 789-2585
Email: info.umfcao@feta.gov.za
Umfolozi FET College
@UmfoloziCollege
www.umfolozicollege.co.za

Campus information:

Chief Albert Luthuli Campus
Tel: 032 559-6555/6564 / Fax: 032 559-6555
Eshowe Campus
Tel: 035 474-2801/2304 / Fax: 035 474-2817
Esikhawini Campus
Tel: 035 796-5568/5576 / Fax: 035 796-5530
Mandeni Campus
Tel: 032 456-3626/8400 / Fax: 032456-5777
Richtek Campus
Tel: 035 902-9500 / Fax: 035 789-7011
Isithembe Skills Centre
Tel: 032 459-2954
Jininindomnyama Skills Centre
Tel: 035 474-4022
Nseleni Skills Centre
Tel: 035 795-1482
Sikhanyisele Skills Centre
Tel: 083 403-0858
Sundumbili Skills Centre
Tel: 032 454-1407
Thubelihle Skills Centre
Tel: 035 796-0803
ZCBF Skills Centre
Tel: 035 797-4313

Umgungundlovu FET College (Pietermaritzburg)

44 Burger Street
Pietermatitzburg, 3201
Tel: 086 010-5790 / Fax: 086 631-3657
Email: NgcoboSS@ufetc.edu.za
www.ufetc.edu.za

Campus information:

Edendale Campus
Tel: 033 341-2253
Umgungundlovu FET college Edendale campus
Midlands Campus
Tel: 033 341-2180

Msunduzi Campus
Tel: 033 341-2200
Northdale Campus
Tel: 033 341-2260
Plessislaer Campus
Tel: 033 341-2230

Limpopo Province

Capricorn College (Polokwane)

16 Market Street
Polokwane, 0699
Tel: 015 291-3118/3115 / Fax: 015 291-2767
Email: smalapane@capricorncollege.co.za

http://capricorncollege.edu.za

Campus information:

Polokwane Campus
Tel: 015 297-0400 / Fax: 015 287-0439
Senwabarwana Campus
Tel: 015 505-3172 / Fax: 015 505-3174
Seshego Campus
Tel: 015 223-0006 / Fax: 015 223-5187

Lephalale FET College (Lephalale)

Cnr Nelson Mandela and Ngoako
Ramatlhodi Drives
Onverwacht
Lephalae
Tel: 014 763-2252 / Fax: 014 763-2253
Email: campusmanager@lepfet.edu.za

www.lephalalefetcollege.co.za

Campus information:

Lephalale Campus
Tel: 014 763-2252 / Fax: 014 763-2253
Modimolle Campus
Tel: 014 717-3807 / Fax: 086 510-5506
Email info.modimolle@lepfet.edu.za

Letaba FET College (Tzaneen)

1 Claude Wheatley Street
Tzaneen, 0850
Tel: 015 307-5440 / Fax: 015 307-2204
Email: centraloffice@letabafet.co.za

Letaba FET College
www.letabafet.co.za

Campus information:

Giyani Campus
Tel: 015 812-3221 / Fax: 015 812-1270
Email: giyanicampus@letabafet.co.za

Maake Campus
Tel: 015 355-3429 / Fax: 015 355-4138
Email: maakecampus@letabafet.co.za
Tzaneen Campus
Tel: 015 307-4438 / Fax: 015 307-4439
Email: tzaneencampus@letabafet.co.za

Mopani South East FET College (Phalaborwa)

Cnr Combretum and Haarlem Street
Phalaborwa, 1390
Tel: 015 781-5721/5 / Fax: 015 781-5346
Email: info@mopanicollege.edu.za

Mopani South East FET College
www.mopanicollege.edu.za

Campus information:

Phalaborwa Campus
Tel: 015 781-1377/8 / Fax: 015 781-1379
Email: phbc@mopanicollege.edu.za
Sir Val Duncan Campus
Tel: 015 769-1513/14 / Fax: 015 769-3746
Email: svdc@mopanicollege.edu.za

Sekhukhune FET College (Groblersdal)

Private Bag X8660
Groblersdal, 0470
Tel: 013 269 0278 / Fax: 013 269-0450
Email: sekfet@sekfetcol.co.za

www.sekfetcol.org

Campus information:

CN Phatudi Campus
Tel: 013 216-8005 / Fax: 013 216-8010
Email: cnpathudi@sekfetcol.co.za
CS Barlow Campus
Tel: 013 269-0020 / Fax: 013 269-0494
Email: csbarlow@sekfetol.co.za

Vhembe FET College (Makhado)

203 Sibasa Unit A
Sibasa, 0970
Tel: 015 963-3156
Email: info@vhembefet.co.za

Vhembe FET College

Campus information:

Makwarela East Campus
Tel: 015 963-3490

Vhembe f.e.t college makwarela campus

Mashamba South Campus
Tel: 015 873-2473
Mavhoi Central Campus
Tel: 015 970-4165

Waterberg FET College (Makopane)
36 Hooge Street
Mokopane, 0600
Tel: 015 491 8581/8602 / Fax: 015 491-8579
Email: hq@waterbergcollege.co.za

www.waterbergcollege.co.za

Campus information:

Lebowakgomo Engineering and Skills Training Centre
Tel: 015 633-6770/1/2/3 / Fax: 015 633-6589
Email: lebowakgomo@waterbergcollege.co.za
Mahwelereng Business Studies Centre
Tel: 015 483-2441/5 or 483-0405
Fax: 015 483-1555 or 483-0405
Email: mahwelereng@waterbergcollege.co.za
Mokopane Information Technology and Computer Science Centre
Tel: 015 483-0090/1 / Fax: 015 483-0066
Email: mokopane@waterbergcollege.co.za

Mpumalanga Province

Ehlanzeni FET College (Nelspruit)
29 Bell Street
Nelspruit, 1200
Tel: 013 752-7105 / Fax: 013 752-4902
Email: info@ehlanzenicollege.co.za

www.ehlanzenicollege.co.za

Campus information:

Nelspruit Campus
Tel: 013 741-3016 / Fax: 013 741-3017
Mlumati Campus
Tel: 013 785-0022 / Fax: 013 784-0214
Mthimba Campus
Tel: 013 798-3531 / Fax: 013 798-3535
Mapulaneng Campus
Tel: 013 795-5069 / Fax: 013 795-5357
Barberton Campus
Tel: 013 712-6640 / Fax: 013 712-7544
KaNyamazane Campus
Tel: 013 794-3767 / Fax: 013 794-1389

Gert Sibande FET College (Standerton)
18a Dr. Beyers Naudé Drive
Standerton, 2430
Tel: 017 712-9040/58 / Fax: 017 712-9059
Email: info@gsc4u.com

www.gscollege.co.za

Campus information:

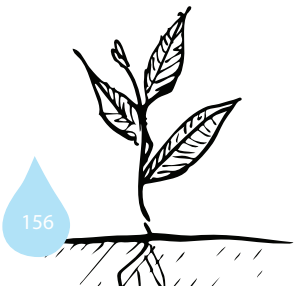
Ermelo Campus
Tel: 017 811-5428 / Fax: 017 819-2570
Email: ermelocampus@gscollege.co.za
Evander Campus
Tel: 017 632-2388 / Fax: 017 632-1863
Email: evandercampus1@gscollege.co.za
Sibanesetfu Campus
Tel: 017 887-9980 / Fax: 017 887-9983
Email: Sibanesetfu@gscollege.co.za
Standerton Campus
Tel: 017 712-2180 / Fax: 017 712-1417
Email: standerton@gscollege.co.za
GSC Skills Academy
Tel: 017 714-1594
Email: mswart@gsc4u.com

Nkangala FET College (Witbank)
Cnr Haig and Northey
Witbank, 1035
Tel: 013 690-1430/3824 / Fax: 013 690-1450
Email: info@nkangalafet.edu.za

Nkangala FET College
www.nkangalafet.edu.za

Campus information:

CN Mahlangu Campus
Tel: 013 973-1324/9113 / Fax: 013 973-1966/9112
Middelburg Campus
Tel: 013 243-2148/2294 / Fax: 013 243-7441
Mpondozankomo Campus
Tel: 013 699-1113/0302 / Fax: 013 696-3175/2181
Witbank Campus
Tel: 013 656-2597/6818 / Fax: 013 656-1845/3665
Waterval Boven Campus
Tel: 083 231-7819 / Fax: 013 257-0477
Extended Learning Unit
Tel: 013 690-1885 / Fax: 013 690-1878



Northern Cape Province

Northern Cape Rural FET College (Upington)
Tel: 054 331 3836
Email: info@ncrfet.co.za

www.ncrfet.co.za

Campus information:

De Aar Campus
Tel: 053 631-0594
Kathu Campus
Tel: 053 723-3281/2
Kuruman Campus
Tel: 053 712-1691
Namaqualand Campus:
Tel: 027 744 1360
Upington Campus
Tel: 054 332-4711/2
Okiep Campus
Tel: 027 744-1440
Business Unit
Tel: 054 331-5289
ICT
Tel: 054 331 5126

Northern Cape Urban FET College (Kimberley)
37 Long Street
Kimberley, 8301
Tel: 053 839-2000

www.fetcolleges.co.za

Campus information:

City Campus
Tel: 053 839-2000
Moremogolo Campus
Tel: 053 802-4700

North West Province

Orbit FET College (Rustenburg)
Fatima Bhayat Street
Rustenburg, 0299
Tel: 014 592-7014 / Fax: 014 592-7013/3164
Email: info@orbitcollege.co.za

ORBIT FET College
@ORBIT_College
www.orbitcollege.co.za

Campus information:

Brits Campus
Tel: 012 252-3788 / Fax: 012 252-7421
Email: info@britscampus.co.za
Mankwe Campus
Tel: 014 555-2900 / Fax: 014 555-5661/2941
Email: info@mankwecampus.co.za
Rustenburg Campus
Tel: 014 592-8461/2 / Fax: 014 592-8473
Email: info@rustenburgcampus.co.za

Taletso FET College (Mmabatho)
Private Bag X128
Mmabatho, 2735
Tel: 018 384-2346/50 / Fax: 018 384-7511
Email: info@taletsofetcollege.co.za

Taletso FET College
www.taletsofetcollege.co.za

Campus information:

Lehurutshe Campus
Tel: 018 363-4187 / Fax: 018 363-3884
Lichtenburg Campus
Tel: 018 632-4317 / Fax: 018 632-3364
Mafikeng Campus
Tel: 018 384-6213/4/5/6 / Fax: 018 384-6217

Vuselela FET College
8 Bram Fischer Street
Klerksdorp, 2571
Tel: 018 406-7800 / Fax: 018 406-7810
Email: enquiries@vuselelacollege.co.za

Vuselela FET College
www.vuselelacollege.co.za

Campus information:

Jouberton Campus
Tel: 018 465-3133/6341 / Fax: 018 465-2037
Email: jouberton@vuselelacollege.co.za
Klerksdorp Campus
Tel: 018 464-0300 / Fax: 018 462-9879
Email: klerksdorp@vuselelacollege.co.za
Matlosana Campus
Tel: 018 484-8906/7/8 / Fax: 018 484-8909
Email: matlosana@vuselelacollege.co.za
Potchefstroom Campus
Tel: 018 293-0352 / Fax: 018 294-7683
Email: potchefstroom@vuselelacollege.co.za
Taung Campus
Tel: 053 995 1376/7 / Fax: 053 995-1354
Email: taung@vuselelacollege.co.za

Western Cape Province

Boland College
85 Bird Street
Stellenbosch, 7599
Tel: 021 886-7111/2 / Fax: 021 886-8260
Email: hq@bolandcollege.com

Boland College
www.bolandcollege.com

Campus information:

Caledon Campus
Tel: 028 212-3270/2 / Fax: 028 212-3271
Email: cal@bolandcollege.com

Bredasdorp Campus
Tel: 028 424-2246

Hermanus Campus
Tel: 028 313-1154 / Fax: 086 233-1953

Kleinmond Campus
Tel: 028 271-3246

Paarl Campus
Tel: 021 872-3323 / Fax: 021 872-5944
Email: paarl@bolandcollege.com

Stellenbosch Campus
Tel: 021 887-3027 / Fax: 021 887-0774
Email: stel@bolandcollege.com

Strand Campus
Tel: 021 853-7611 / Fax: 021 854-8756
Email: strand@bolandcollege.com

Worcester Campus
Tel: 023 348-6920 / Fax: 023 342-5768
Email: wor@bolandcollege.com

College of Cape Town College
334 Albert Road
Salt River
Tel: 086 010-3682 / 021 404-6700
Fax: 086 615-0582 / 021 404-6701
Email: info@cct.edu.za

College of Cape Town – Inspiring Minds
@CCT_Official
www.cct.edu.za

Campus information:

Athlone
Tel: 021 637-9183 / Fax: 021 638-3255

City
Tel: 021 462-2053 / Fax: 021 461-1608

Crawford
Tel: 021 696-5133/4/5 / Fax: 021 696-5136

Gardens
Tel: 021 461-9418 / Fax: 021 464-3857

Guguletu
Tel: 021 638-3131/637-0606 / Fax: 021 638-4539

Pinelands
Tel: 021 531-2105 / Fax: 021 531-0361

Thornton
Tel: 021 531-9124 / Fax: 021 531-9150

Wynberg
Tel: 021 797-5540 / Fax: 021 797-6682

False Bay College
Cnr Main and Atlantic Roads
Muizenberg, 7945
Tel: 021 003-0600 / Fax: 021 788-2533

False Bay College
@FalsebayCollege
www.falsebaycollege.co.za

Campus information:

Khayelitsha Campus
Tel: 021 361-3430 / Fax: 021 361-8880

Muizenberg Campus
Tel: 021 788-8373 / Fax: 021 778-2417

Fish Hoek Campus
Tel: 021 78-0144 / Fax: 021 782-6131

Westlake Campus
Tel: 021 701-1340 / Fax: 021 701-1855

Mitchells Plain Campus
Tel: 021 391-0717 / Fax: 021 391-0723

Northlink College
80 Voortrekker Road
Bellville, 7530
Tel: 086 006-5465 / Fax: 086 027-8839

SMS: sms NLINK and your message to 43122 and we will contact you

Nothlink College
@northlink
www.northlink.co.za

Campus information:

Belhar Campus
Tel: 021 952-2113/9 / Fax: 021 952-6694

Bellville Campus
Tel: 021 951-2231 / Fax: 021 951-3018/3967

Parow Campus
Tel: 021 931-8238 / Fax: 021 931-82444

Protea Campus
Tel: 021 946-2250 / Fax: 021 949-0886

Tygerberg Campus
Tel: 021 524-2200 / Fax: 021524-2300

Wingfield Campus
Tel: 021 591-9207 / Fax: 021 592-3923

South Cape College

125 Mitchell Street
George, 6530
Tel: 044 884-0359 / Fax: 044 884-0361
Email: central@scccollege.co.za

www.sccollege.co.za

Campus information:

George Campus
Tel: 044 874-2360 / Fax: 044 874-4517
Email: george@sccollege.co.za

Hessequa Campus (Riversdale)
Tel: 028 713-4775 / Fax: 028 713-4775
Email: hessequa@sccollege.co.za

Mossel Bay Campus
Tel: 044 693-2613 / Fax: 044 693-3089
Email: mosselbay@sccollege.co.za

Oudtshoorn Campus
Tel: 044 272-2110/9 / Fax: 044 279-2463
Email: oudtshoorn@sccollege.co.za

Beaufort West Campus
Tel: 023 414-3064 / Fax: 023 414-3664
Email: beaufort@sccollege.co.za

Bitou Campus
Tel: 044 533-2388 / Fax: 044 533-0399
Email: bitou@scccollege.co.za

West Coast FET College

48 Voortrekker Road
1st Floor Clicks Building
Malmesbury
Tel: 022 482-1143
Email: enquiries@westcoastcollege.co.za

West Coast College Institution of Excellence
www.westcoastcollege.co.za

Campus information:

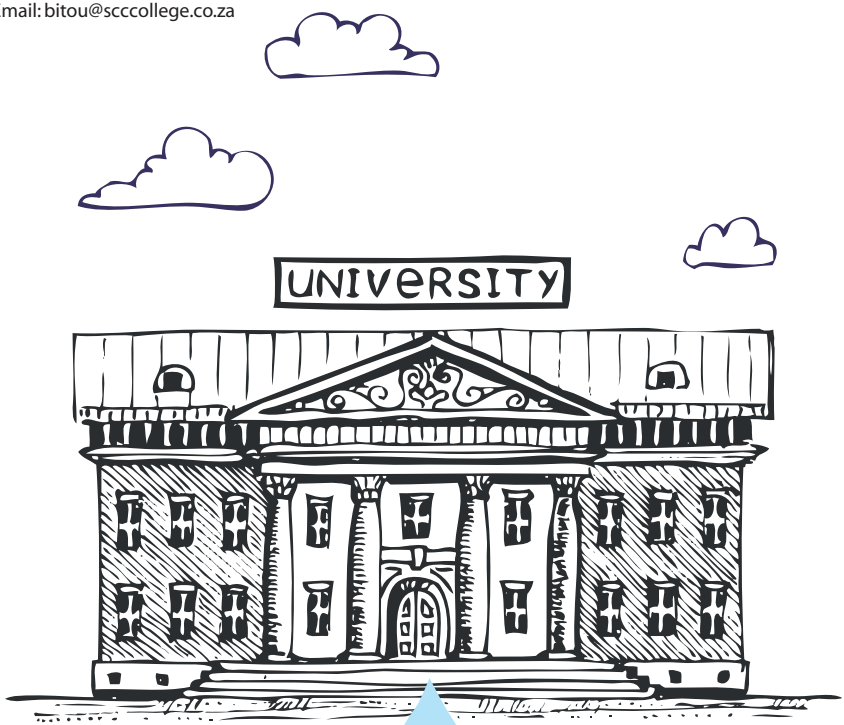
Atlantis Campus
Tel: 021 577-1727

Citrusdal Campus
Tel: 022 921-2457

Malmesbury Campus
Tel: 022 487-2851/2/3

Vredenburg Campus
Tel: 022 713-3167/18

Vredendal Campus
Tel: 027 213-5673/4



Section 5: Water-related departments, organisations, societies and institutions

SECTOR EDUCATION AND TRAINING AUTHORITIES (SETA)

AgriSETA – Agriculture Sector Education and Training Authority
PO Box 26024
Arcadia, 0007
Tel: 012 301-5600 / Fax: 012 325-1677/1624
Email: info@agriseta.co.za
www.agriseta.co.za

BankSETA – Banking Sector Education and Training Authority
PO Box 11678
Vorna Valley, 1686
Tel: 086 102-0002 / 011 805-9661
Fax: 011 805-8348
Email: info@bankseta.org.za
The BankSETA
@TheBankSETA
The BANKSETA
www.bankseta.org.za

CathsSETA – Construction Education and Training Authority
Cnr Rivonia Road and Katherine Street
Sandton, 2146
Tel: 011 217-0600
Email: info@catsseta.org.za
Cathsseta
@Cathsseta1
www.cathsseta.org.za

CetaSETA – Construction Education and Training Authority
PO Box 1955
Halfway House, 1685
Tel: 011 265-5900 / Fax: 011 265 5924/5
www.ceta.org.za

CHE – Council on Higher Education
PO Box 94
Persequor Technopark
Brummeria, 0020
Tel: 012 349-3840
Email: admin@che.ac.za
www.che.ac.za

ChietaSETA – Chemical Industries Education and Training Authority
PO Box 961
Auckland Park, 2006
Tel: 086 024-4382
Email: info@chieta.org.za
www.chieta.org.za

EWSETA – Energy and Water Sector Education and Training Authority
PO Box 5983
Johannesburg, 2000
Tel: 011 274-4700 / Fax: 011 484-8953/1078
Email: info@eseta.org.za
www.eseta.org.za

ETDP SETA – Education, Training and Development Practices
Private Bag X105
Melville, 2109
Tel: 011 372-3300 / Fax: 011 453-5379
Email: info@etdpseta.org.za
www.etdpseta.org.za

FASSET – Financial and Accounting Services Sector Education and Training Authority
PO Box 6801
Cresta, 2118
Tel: 086 101-0001 / 011 476-8570
Fax: 011 476-5756
Email: fassetcallcentre@fasset.org.za
www.fasset.org.za

FP&M SETA – Fibre Processing and Manufacturing Sector Education and Training Authority
The Minister of Higher Education and Training amalgamated the Clothing, Textiles, Footwear and Leather Sector Education (CTFLSETA), Forest Industries Education and Training Authority (FIETA) and specific sub-sectors of the Media, Advertising, Publishing, Printing and Packaging Education and Training Authority (MAPPP SETA) into the Fibre Processing Manufacturing Sector Education and Training Authority.

PO Box 31276
Braamfontein
Tel: 011 403-1700 / Fax: 011 403-1718
Email: info@fpmseta.org.za

www.fpmseta.org.za

FOODBEV – Food and Beverages Manufacturing Industry Sector Education and Training Authority
PO Box 245
Gallo Manor, 2052
Tel: 011 253-7300 / Fax: 011 253-7333
Email: info@foodbev.co.za

www.foodbev.co.za

HPCSA – Health Professions Council of SA
PO Box 205
Pretoria, 0001
Tel: 012 338-9300/01 / Fax: 012 328-5120
Email: info@hpcsa.co.za

www.hpcsa.co.za

HWSETA – Health and Welfare Sector Educational Training Authority
Private Bag X15
Bradford Corner
Gardneview, 2047
Tel: 080 086-4478 / 011 607-6900
Fax: 011 616-8939
Email: hwseta@hwseta.co.za

Hwseta
The HWSETA (Head Office – JHB)
www.hwseta.org.za

INSETA – Insurance Sector Education and Training Authority
PO Box 32035
Braamfontein, 2017
Tel: 086 113-0013 / 011 544-2000
Fax: 011 484-0862
Email: insetacallcentre@inseta.org.za

INSETA
www.inseta.org.za

LGSETA – Local Government Sector Education and Training Authority
PO Box 1964
Bedfordview, 2008
Tel: 011 456-8579 / Fax: 011 450-4948

www.lgseta.co.za

MERSETA – Manufacturing, Engineering and Related Services Sector Education and Training Authority
merSETA House
75 7th Avenue
Cnr Rustenburg Road
Melville
Tel: 086 163-7738 / 010 219-3000
Fax: 011 484-5499
Email: merseta@thehotline.co.za

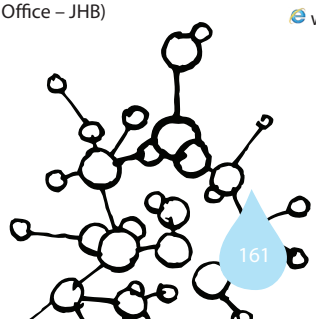
www.merseta.org.za

MICTSETA – Media, Information and Communication Technologies Sector Education and Training Authority
PO Box 5585
Halfway House
1685
Tel: 011 207-2600 / Fax: 011 805-6833

www.mict.org.za

MQA – Mining Qualifications Authority
Private Bag X118
Marshalltown
2107
Tel: 011 547-2600

www.mqa.org.za



PAB – Professional Accreditation Body for Health and Skincare
Postnet Suite 180
Private Bag X06
Waterkloof, 0145
Tel: 082 596-5847 / Fax: 086 571-2683
Email: pab.etqa@gmail.com

www.pab.org.za

PSETA – Public Service Sector Education and Training Authority
420 Festival Road
Hatfield
Pretoria
Tel: 012 423-5700
Email: Margaretm@pseta.gov.za

Public Service Sector Education and Training Authority
@PSETA1
www.pseta.gov.za

SABPP – South African Board for Personnel Practice
PO Box 2450
Houghton, 2041
Tel: 011 482-8595 / Fax: 011 482-4830
Email: info@sabpp.co.za

SABPP
@SABPP1
SABPP
www.sabpp.co.za

SAICA – South African Institute of Chartered Accountants
7 Zulberg Close
Bruma Lake, 2198
Tel: 086 107-2422
Email: saica@saica.co.za

Saica – The South African Institute of Chartered Accountants
@saica_ca_sa
SAICA: South African Institute of Chartered Accountants
www.saica.co.za

SANC – South African Nursing Council
PO Box 1123
Pretoria, 0001
Tel: 012 420-1000 / Fax: 012 343-5400
Email: registrar@sanc.co.za

South African Nursing Council
www.sanc.co.za

SAPC – South African Pharmacy Council
Private Bag X40040
Arcadia, 0007
Tel: 086 172-7200 / Fax: 012 321-1492/79
Email: customercare@sapc.za.org

South African Pharmacy Council
www.pharmcouncil.co.za

SASSETA – Security Sector Education and Training Authority
PO Box 7612
Halfway House, 1685
Tel: 086 110-2477 / 011 347-0200
Fax: 011 205-0046
Email: callcentre@saseta.org.za

Sasseta
@sasseta
SASSETA
www.sasseta.org.za

SERVICES SETA – Services Sector Education and Training Authority
15 Sherborne Road
Parktown
Tel: 011 276-9600 / Fax: 011 276-9623
Email: customercare@serviceseta.org.za

Services SETA
@ServiceSETA
Services SETA
www.serviceseta.org.za

TETA – Transport Education and Training Authority
Private Bag X10016, Randburg 2125
Tel: 011 781-1280 / Fax: 011 886-2502
Email: coms@teta.org.za

Transport Education Training Authority
www.teta.org.za

UMALUSI – Council for Quality Assurance in General and Further
Education and Training
Postnet Suite 102
Private Bag X1
Queenswood, 0121
Tel: 012 349-1510 / Fax: 012 349-1511
Email: info@umalusi.org.za

Umalusi
www.umlasi.org.za

W&RSETA – Wholesale and Retail Sector Education and Training Authority
PO Box 9809
Centurion, 0046
Tel: 012 622-9500
Call Centre: 0860 270 027
Wholesale & Retail SETA
@WRSETA
W&R SETA
www.wrseta.org.za

WATER-RELATED DEPARTMENTS, ORGANISATIONS, SOCIETIES AND INSTITUTIONS

National

Actuarial Society of SA
PO Box 4464
Cape Town, 8000
Tel: 021 509-8210
Email: mallony@actuarialsociety.org.za
www.assa.org.za

Agricultural Research Council
PO Box 8783
Pretoria, 0001
Tel: 012 427-9700 / Fax: 012 342-3948
Email: nkami@arc.agric.za
www.arc.agric.za

Borehole Water Association of Southern Africa
PO Box 1155
Saxonwold, 2132
Tel: 011 447-0853 / Fax: 011 447-0851
Email: info@bwa.co.za
www.bwa.co.za

Consulting Engineers South Africa
PO Box 68482
Bryanston, 2021
Tel: 011 463-2022 / Fax: 011 463-7383
Email: general@cesa.co.za
www.cesa.co.za

Council for Geoscience
Private Bag X112
Pretoria, 0001
Tel: 012 841-1911 / Fax: 012 841-1221
Email: info@geoscience.org.za
www.geoscience.org.za

CSIR
PO Box 395
Pretoria, 0001
Tel: 012 841-2911 / Fax: 012 349-1153
Email: callcentre@csir.co.za
www.csir.co.za

Department of Agriculture, Fisheries and Forestry
Private Bag X250
Pretoria, 0001
Tel: 012 319-6000 / Fax: 012 319-0000
Email: enquiries@daff.gov.za
Department of Agriculture, Forestry & Fisheries
@DAFF_Ministry
www.nda.agric.za or www.daff.gov.za

Department of Environmental Affairs and Tourism
Private Bag X447
Pretoria, 0001
Call Centre: 086 111-2468
Tel: 012 310-3661 / Fax: 012 322-0082
Email: nlevin@ozone.pwv.gov.za
www.environment.gov.za

Department of Health
Private Bag X828
Pretoria, 0001
Tel: 012 395-8000 / Fax: 012 395-9165
Email: khanyv@health.gov.za
Web: www.doh.gov.za

Department of Science and Technology
Private Bag X894
Pretoria, 0001
Tel: 012 843-6300

Department of Science and Technology
@dstgovza
www.dst.gov.za

Department of Water Affairs
Private Bag X313
Pretoria, 0001
Tel: 012 336-8664 / Fax: 012 336-8664
Toll Free: 080 020-0200

www.dwaf.gov.za

Development Bank of Southern Africa
PO Box 1234
Halfway House, 1685
Tel: 011 313-3911 / Fax: 011 313-3086

www.dbsa.org

DWA Learning Academy
Tel: 012 336-7448 / Fax: 086 562 2569
Email: meyerv@dwa.gov.za

www.dwa.gov.za/LearningA

Engineering Council of South Africa
Private Bag X691
Bruma, 2026
Tel: 011 607-9500 / Fax: 011 622-9295
Email: engineer@ecsa.co.za

www.ecsa.co.za

Environmental Law Association of South Africa
Private Bag X6001
Potchefstroom, 2520
Tel: 018 299-1924/1954 / Fax: 018 299-1923
Email: Enviro.Association@gmail.com

www.elasa.co.za

Eskom
PO Box 1091
Johannesburg, 2000
Tel: 011 800-8111 / Fax: 011 800-4299

Eskom
@ Eskom_SA
www.eskom.co.za

Groundwater Division of the Geological Society of Southern Africa
Tel: 012 348-9598
Email: info@gwd.org.za

Ground Water Division of South Africa
@gwdivision
www.gwd.org.za

Human Sciences Research Council
Private Bag X41
Pretoria, 0001
Tel: 012 302-2000 / Fax: 012 302-2001

Human Sciences Research Council (HSRC)
@HSRCza
www.hsrc.ac.za

Institute of Municipal Engineering of South Africa
PO Box 2190
Westville, 3630
Tel: 031 266-3263 / Fax: 031 266-5094
Email: admin@imesa.org.za

www.imesa.org.za

International Water Management Institute
Private Bag X813
Silverton, 0127
Tel: 012 845-9100 / Fax: 012 804-6397
Email: iwmi-southern_africa@cgiar.org

http://southernafrica.iwmi.cgiar.org

Maritime College
Tel: 011 339-1301 / Fax: 011 339-8495
Email: cbms@maritimecollege.co.za

http://www.maritimecollege.co.za/contact_us.htm

National Research Foundation
PO Box 2600
Pretoria, 0001
Tel: 012 481-4000 / Fax: 012 349-1179
Email: info@nrf.ac.za

www.nrf.ac.za

Society of South African Geographers
PO Box 339
Bloemfontein, 9300
Tel: 051 401-2184 / Fax: 051 401-3816
Email: britss@ufs.ac.za

www.ssag.co.za

South African Institute of Agricultural Engineers
Private Bag X519
Pretoria, 0001
Tel: 012 842-4023 / Fax: 012 842-4216

http://saiae.co.za
www.arc.agric.za

South African Institute for Aquatic Biodiversity
Private Bag X1015
Grahamstown, 6140
Tel: 046 603-5800 / Fax: 046 622-2403

www.saiab.ac.za

South African Institution of Civil Engineering
Private Bag X200
Halfway House, 1685
Tel: 011 805-5947/48/53 / Fax: 011 805-5971
Email: civilinfo@saice.org.za

The South African Institution of Civil Engineering (SAICE)
@saicecivil
The South African Institution of Civil Engineering (SAICE) Blog: http://saice-blog.co.za
www.saice.org.za

South African National Committee on Large Dams
PO Box 3404
Pretoria, 0001
Tel: 012 460-9100 / Fax: 012 336-8561
Email: secretary@sancold.org.za

www.sancold.org.za

South African National Biodiversity Institute
Private Bag X101
Pretoria, 0001
Tel: 012 843-5000 / Fax: 012 804-3211
Email: info@sanbi.org.za

www.sanbi.org.za

South African National Parks Scientific Services
PO Box 106
Skukuza, 1350
Tel: 013 735-4148
Email: dpienaar@sanparks.org

South African National Parks
@SANParks
South African National Parks (SANParks)
SANParks SANParks
www.sanparks.co.za/parks/kruger/conservation/scientific/organogram/

South Africa Irrigation Institute
PO Box 834
Strand, 7139
Tel: 021 850-8220
Email: info@sabi.co.za

www.sabi.co.za

South African Weather Service
Private Bag X097
Pretoria, 0001
Tel: 012 367-6000
Email: met.training@weathersa.co.za

@SAWeatherServic
www.weathersa.co.za

Regional Offices

- Bethlehem Weather Office
  Tel: 082 233-9100
  Email: salesbl@weathersa.co.za
- Cape Town
  Tel: 082 233-8400
  salesct@weathersa.co.za
- King Shaka (Durban)
  Tel: 082 233-9500
  Email: salesdn@weathersa.co.za
- Port Elizabeth
  Tel: 083 123-0500
  Email: salespe@weathersa.co.za

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PO Box 6011
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Water Institute of Southern Africa
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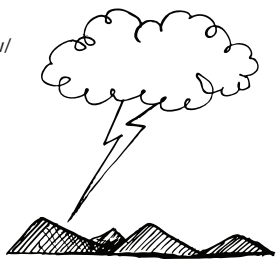
www.wisa.org.za

Working for Water
www.dwaf.gov.za/wfw/



World Wildlife Fund
PO Box 23273
Claremont, 7735
Tel: 021 657-6600 / Fax: 086 535-9433
Email: info@wwf.org.za

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@WWFSouthAfrica
www.wwf.org.za

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Blog: http://albanymuseum.blogspot.com

www.ru.ac.za/albanymuseum

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Fax: 046 622-9427

www.ru.ac.za/institutes/iwr

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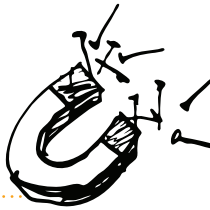
http://ses.nmmu.ac.za

Unilever Centre for Environmental Water Quality
Institute for Water Research
Rhodes University



PO Box 94
Grahamstown, 6140
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Fax: 046 622-9427
Email: ucewq@ru.ac.za

www.ru.ac.za/static/institutes/iwr//ucewq

Free State

Bloemwater
PO Box 30121
Pellissier, 9322
Tel: 051 403-0800 / Fax: 051 422-5333
Email: info@bloemwater.co.za

Bloemwater
www.bloemwater.co.za

Centre for Environmental Management
The Centre for Environmental Management
Internal Box 67
University of the Free State
PO Box 339
Bloemfontein, 9300
Tel: 051 401-3938 / Fax: 051 401-2629
Email: CEM@ufs.ac.za

http://natagri.ufs.ac.za/content.aspx?id=301

Centre for Sustainable Agriculture
University of the Free State
PO Box 339
Bloemfontein, 9300
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Email: lottere@ufs.ac.za

http://natagri.ufs.ac.za/content.aspx?DCode=102

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http://natagri.ufs.ac.za/contact.aspx?DCode=099

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http://natagri.ufs.ac.za/content.aspx?DCode=107

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http://natagri.ufs.ac.za/content.aspx?DCode=116

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http://natagri.ufs.ac.za/content.aspx?DCode=119

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(Internal box 56)
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PO Box 339
Bloemfontein, 9300
Tel: 051 401-9576 / Fax: 051 401-3005
Email: fouriefd@ufs.ac.za (cc to: igs-info@ufs.ac.za)

http://natagri.ufs.ac.za/content.aspx?DCode=109

Gauteng

Centre for Applied Legal Studies
Private Bag X3
Wits University, 2050
Tel: 011 515-8600 / Fax: 011 717-1702
Email: Duduzile.Mlambo@wits.ac.za

www.wits.ac.za/academic/clm/law/cals/11159/cals_home.html

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http://web.up.ac.za/default.asp?ipkCategoryID=2052

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Email: chemeng@up.ac.za

http://web.up.ac.za/default.asp?ipkCategoryID=2063

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Email: marilise.lombard@up.ac.za

http://web.up.ac.za/default.asp?ipkCategoryID=2407

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http://web.up.ac.za/default.asp?ipkCategoryID=4645

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http://www.uj.ac.za/EN/Faculties/health/departments/environmental/Pages/About.aspx

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www.tut.ac.za/Students/facultiesdepartments/science/departments/environscience/

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Email: csc@up.ac.za

http://web.up.ac.za/default.asp?ipkCategoryID=3637

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Email: fanus.venter@up.ac.za

http://web.up.ac.za/default.asp?ipkCategoryID=1436

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Email: susannab@uj.ac.za

Zoology UJ (Zoology At UJ)
www.uj.ac.za/zoology

East Rand Water Care Company
PO Box 13106
Norkem Park, 1631
Tel: 011 929-7000 / Fax: 011 929-7031
Email: mail@erwat.co.za

www.erwat.co.za

Johannesburg Water
PO Box 61542
Johannesburg, 2107
Tel: 011 688-1400 / Fax: 011 688-1528
Email: customerserviceemails@jwater.co.za

Johannesburg Water
@jhbwater
www.johannesburgwater.co.za

Midvaal Water
PO Box 31
Stilfontein, 2550
Tel: 018 482-9500 / Fax: 018 482-1110
Email: info@midvaalwater.co.za

www.midvaalwater.co.za

Rand Water
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Johannesburg, 2000
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Email: customerservice@randwater.co.za

www.randwater.co.za

Vulnerability, Adaptation, Mitigation and Planning (ReVAMP) Research Group
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www.wits.ac.za/academic/science/geography/research/revamp/5624/revamp_home.html

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www.wits.ac.za/academic/ebe/cwe/5399/civil_engineering.html

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www.wits.ac.za/geosciences

Trans-Caledon Tunnel Authority
PO Box 10335
Centurion
South Africa, 0046
Tel: 012 683-1200 / Fax: 012 683-1361
Email: info@tcta.co.za

www.tcta.co.za

Water Research Commission
Private Bag X03
Gezina, 0031
Tel: 012 330-0340 / Fax: 012 331-2565
Email: info@wrc.org.za

Water Research Commission
@WaterResearchSA
WRC South Africa
www.wrc.org.za

Water Research Node
Monash South Africa
Private Bag X60
Roodepoort, 1725
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@WaterResearchSA
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KwaZulu-Natal

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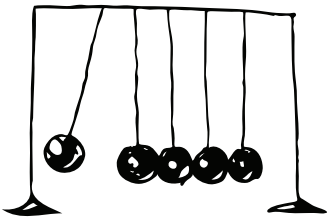
Email: Stuart-Hills@ukzn.ac.za

www.ukzn.ac.za



Chemical Engineering
Durban University of Technology
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Durban, 4000
Tel: 031 373-2218 / Fax: 031 373-2285
Email: xoliled@dut.ac.za

www.dut.ac.za/faculty/engineering/chemical_engineering_and_pulp_paper

Pollution Research Group
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4041
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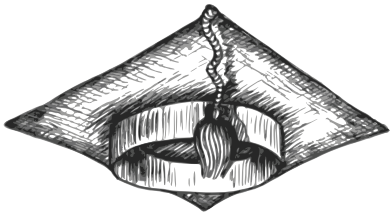
Scottsville, 3209
Tel: 033 260-5103 / Fax: 033 260-5105
Email: flockhart@ukzn.ac.za

http://lifesciences.ukzn.ac.za



Sugar African Sugarcane Research Institute
Private Bag X02
Mount Edgecombe, 4300
Tel: 031 508-7400 / Fax: 031 508-7597
Email: sasri@sugar.org.za

www.sasa.org.za/sasri

Umgeni Water
PO Box 9
Pietermaritzburg, 3200
Tel: 033 341-1111 / Fax: 033 341-1167

Umgeni Water-Amanzi
www.umgeniwater.co.za

Limpopo

Association for Water and Rural Development (AWARD)
Private Bag X483
Acornhoek, 1360
Tel: 015 793-7500 / Fax: 015 793-7509
Email: Sharon@award.org.za

www.award.org.za

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CapeNature
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http://web.uct.ac.za/depts/geolsci/

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www.civeng.sun.ac.za

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Email: unescochair@uwc.ac.za

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Urban Water Management Group

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www.civil.uct.ac.za/research/urbanwater/

Section 6: Bursary and internship information

BURSARY AND LEARNERSHIP ADMINISTRATORS

Africa Education

www.africaeducation.org/bursaries.htm

Bursary partners

- **Edu-Loan**
  Tel: 086 055-5544
  SMS 'edu' to 32150 and we'll call you back
  www.eduloan.co.za
- **National Student Financial Aid** Scheme
  Tel: 021 763-3232
  Email: info@nsfas.org.za
  Send a query by SMS to 32261 (Standard SMS Rates apply.)
  www.nsfas.org.za
- **Medical Research Council of South Africa**
  Tel: 021 938-0911 / Fax: 021 938-020
  Email: info@mrc.ac.za
  www.mrc.ac.za/funding/researchopport.htm
- **National Research Foundation**
  Tel: 012 481-4081
  Email: supportdesk@nrf.ac.za
  http://www.nrf.ac.za/students.php
- **Monash South Africa**
  Tel: 011 950-4000
  Email: inquiries@monash.ac.za
  www.monash.ac.za/study/scholarships-bursaries/monash-south-africa-bursary.html
- **Anglo American**
  Tel: 011 638-9111
  www.angloamerican.com/careers/graduates
- **South African Breweries**
  Tel: 011 881-8111
  www.sab.co.za
- **Mintek**
  Tel: 011 709-4111 / Fax: 011 793-2413
  www.mintek.co.za
- **PriceWaterhouseCoopers**
  Tel: 0 11 797-4135
  www.pwc.co.za/en/students/index.html
- **Masakh' iSizwe Centre of Excellence**
  Tel: 021 483 9545 / Fax: 021 483 2615
  Email: Lee.Maggott@westerncape.gov.za
  www.westerncape.gov.za/eng/directories/services/27438/141473
- **Funza Lushaka Bursary Programme**
  Tel: 021 763-3232
  Email: info@nsfas.org.za
  www.nsfas.org.za/bursary.htm
- **HCI Foundation**
  Tel: 021424-6010 / Fax: 021 424-6019
  Email: gjacobs@hcifoundation.co.za
  www.hcifoundation.co.za
- **CSIR**
  Tel: 012 841-3256
  Email: Nzama@csir.co.za
  www.csir.co.za/recruitment/csirburse.php
- **EVRAZ**
  Tel: 013 690-9298/9911
  Email: Talent@evrazhighveld.co.za
  www.evrazhighveld.co.za/bursaries.asp
- **Harmony Gold**
  Tel: 011 278-0074 / Fax: 011 412 4007
  Email: evelyn.moalosi@Harmony.co.za
  www.harmony.co.za/
- **Canon Collins Trust**
  www.canoncollins.org.uk/scholarships.html
- **Safcol**
  Tel: 013 754-2700/43 / Fax: 013 754-2732
  Email: portia@klf.co.za / info@klf.co.za
  www.safcol.co.za/index.php?option=com_content&view=article&id=72&itemid-25

African Scholars Fund

FET colleges
Tel: 021 689-9094/9431 / Fax: 021 689-9240
Email: office@asf.org.za

www.asf.org.za

Career Wise

Tel: 011 484-7505
Email: info@careerwise.co.za

www.careerwise.co.za

Go Study

www.gostudy.mobi/bursaries/all/default.aspx

National Student Financial Aid Scheme (NSFAS)

- **Social Work** for the Department of Social Development

- **National Skills Fund** for students with a study focus in a scarce skills area.
- **FET College Bursaries – National Certificate (Vocational)** and for certain **NATED** courses

Tel: 021 763-3232
ShareCall: 086 006-7327
Email: info@nsfas.org.za
Send a query by SMS to 32261 (Standard SMS Rates apply.)

www.nsfas.org.za/bursary.htm

Rural Education Access Programme

Commerce, Science and Engineering
Tel: 021 696-5500 / Fax: 021 696-9572
Email: reception@reap.org.za

www.reap.org.za

SA Bursaries

www.sabursaries.com

- South African Bursaries
- Global Scholarships
- South African Tertiary Information

SAGI

Surveying and Geomatics
Tel: 031 563-9481 / Fax: 031 563-5254
Email: admin.officer@sagi.co.za

South African Geomatics Institute
www.sagi.co.za/bursaries.php

SA Study

SA Study
@SAstudy
http://sastudy.co.za/bursaries/

South African Bursaries

www.sa-bursaries.co.za
www.sa-bursaries.co.za/engineering-built-environment-and-science-bursaries/

- **Harmony Gold**
- **FoodBev**
- **WK Construction**
- **Allan Grey Orbis Foundation**
- **Truworths Fashion Academy**
  Tel: 021 448-9379 or 021 448-8382
  Fax: 021 447 6708
  Email: info@daf-academy.co.za
- **Anglo Base Metals Vocational Bursaries**
- **Basil Read Bursary**
  Tel: 011 418-6365 / Fax: 011 418-6517/6419
  Email: jfourie@basilread.co.za
- **Chevron Bursary**
- **Eskom University Bursary**
  Tel: 011 800-8111
  www.eskom.co.za
- **Bergstan South Africa Bursary**
  Tel: 021 487 4900
  Email: hr@bergstan.co.za
  www.engineer.co.za
- **BKS (Pty) Ltd Group Bursary Fund**
  Tel: 012 421-3798
  Email: lorrainevz@bks.co.za
- **Fred Bousfield Moss Blundell Memorial Scholarships**
- **Grinaker – LTA Building Cape Bursary Scheme**
  Tel: 011 578-6000 / Fax: 011 578-6161
  Email: hrinfo@grinaker-lta.co.za
  www.grinaker-lta.com
- **Grinaker – LTA Bursary Scheme**
  Tel: 011 578-6000 / Fax: 011 578-6161
  Email: hrinfo@grinaker-lta.co.za
  www.grinaker-lta.com
- **Group Five Bursary**
  Tel: 011 806-0111 / Fax: 011 806-8376
  Email: bursary@groupfive.co.za
  www.g5.co.za
- **Hatch Engineering Bursary**
  Tel: 011 519-0200
  Email: bursaries@jaws.co.za
  www.jaws.co.za
- **Masakh' iSizwe Bursary**
  Tel: 021 483-5851
  Email: masakhisizwe@pgwc.gov.za
  www.capegateway.gov.za/masakh
- **Murray and Roberts Bursary Scheme**
  Tel: 011 456-1144
  Email: clientservice@murrob.com / bursary@murrob.com
  www.murrob.com/careers_overview.asp
- **PPC Bursary**
- **Sappi Bursary**
  Tel: 011 407-8111
  www.sappi.com
- **Sentech Educational Fund**
  Tel: 086-073-6832 / Fax: 086 743-4411
  Email: trainsec@sentech.co.za / support@sentech.co.za
  www.sentech.co.za

- **Transnet Bursary**
  Tel: 011 308-3000 / Fax: 011 308-2638
  Email: engquiries@transnet.net
  www.transnet.net
- **UWP Consulting Bursaries**

Studie Trust

This is a national bursary agency that provides bursaries for financially needy students.
A prospective student only has to submit one application form. Each application will automatically be considered for all the bursaries for which a particular applicant qualifies.

Applications are invited for the following types of access bursaries:

- School bursaries (grades 9-12)
- Agricultural college bursaries
- FET college bursaries
- University of Technology bursaries
- University bursaries

Current Sponsors:

- AVI Bursary Programme
- Coronation Fund Managers Bursary Programme
- FNB Fund Bursary Programme
- Investec Specialist Bank CSI Bursary Programme
- Peregrine Educational Trust Bursary Programme
- Pick n Pay Employee Bursary Scheme
- Sun International Community Development Trust Bursary Programme

Tel: 011 403-1632 / Fax: 086 567-5604
Email: info@studytrust.org.za

Studietrust
@Studietrust
@StudieCommunity
www.studytrust.org.za/bursaries/bursary-categories/sponsored-bursaries

The Bursary Institute of South Africa (BISA)

BISA offers bursaries from 25% to 75% of costs for South African students at FET colleges, covering a wide range of career choices.
Email: info@tbisa.co.za
www.tbisa.co.za

The Careers Portal

Careers Portal
www.careersportal.co.za

Tshikululu Social Investments

- Discovery Foundation
  Email: discoveryfoundation@tsi.org
- FNB
  Email: firstrandfoundation@tsi.org.za
- Chairmans Fund – Anglo American
  Email: aacf@tsi.org.za
- De Beers Fund
  Email: debeersfund@tsi.org.za

Tel: 011 544-0300 / Fax: 011 484-5997

www.tshikululu.org.za

ORGANISATIONS OFFERING BURSARIES AND/OR LEARNERSHIPS

ABSA

Tel: 011 350-4000
Email: absa@absa.co.za

ABSA
www.absa.co.za/Absacoza/About-Absa/Careers/Bursaries

Adams & Adams Bursary Scheme

Tel: 012 432-6000 / Fax: 012 432-6599
Email: mail@adamsadams.com

www.adamsadams.com

Afrox Bursary for Engineering

Tel: 086 002-0202 / Fax: 086 673-6425
Email: bursary.afrox@afrox.linde.com

http://afrox-co-za.win32.glodns.net/UserInterface/AboutAfrox/AfroxBursaryScheme/ bursary_howtoapply.aspx

Alexander Forbes

In partnership with the Insurance Sector Education and Training Authority (INSETA)

- Graduate Development Programme
  Email: graduates@aforbes.co.za
- Internship Programme
  Email: graduates@aforbes.co.za
- Learnership Programme
  Email: Learnerships@aforbes.co.za

Tel: 011 269-0000 / Fax: 011 269-0149
Email: info@aforbes.co.za

www.alexanderforbes.co.za/careers/Talent-Development.aspx

Anglo Platinum Bursary
Tel: 011 373-6617 / Fax: 011 373-5617
Email: tranyane@anglplat.com

www.angloplatinum.com

Auditor-General South Africa
Bursaries in accounting
300 Middel Street
New Muckleneuk
Pretoria
Tel: 012 426-8000 / Fax: 012 426-8257

www.agsa.co.za/careers/bursaries.aspx

Aurecon South Africa Bursary
Tel: 012 427-2481 / Fax: 012 427-2144
Email: Yolande.Estrela@af.aurecongroup.com or Fredah.Nkuna@af.aurecongroup.com

www.aurecongroup.co.za

CATHSSETA Bursary
Tel: 011 217-0600
Email: lebohangm@cathsseta.org.za

www.cathsseta.org.za/index.php/2013/03/15/cathsseta-bursary-programme/

C·I·B
Tel: 021 808-2832 / Fax: 021 808-2995
Email: cib@sun.ac.za

http://academic.sun.ac.za/cib/bursaries.asp

Citrus Bursary
Tel: 031 312-1326
Email: learnmore@citrusacademy.org.za

www.citrusacademy.org.za

De Beers
Tel: 053 839-4111 / Fax: 053 839-4210

www.debeersgroup.com

Department of Environmental Affairs
Bursaries and internships
Thomas Mathiba (Director: Sector Education, Training and Development)
Email: tmathiba@environment.gov.za
Tel: 012 310-3653

www.environment.gov.za/careers/bursaries

Department of Higher Education and Training FET College Bursary Scheme
Bursaries for the National Certificate (Vocational) and for certain National N-Diploma courses at FET Colleges are available for qualifying students. There is no employment condition attached to these bursaries. Students must apply for funding through the Student Support Services in each campus.
Tel: 080 087-2222

East Rand Water
Tel: 011 929-7000
Email: hr@erwat.co.za

www.erwat.com/page.php?pageID=19

Groen Sebenza Internship programme
Biodiversity sector

www.sanbi.org/programmes/education-hcd/groen-sebenza

Institute of Race Relations
Tel: 011 482 7221 / Fax: 011 482-7693
Email: prisca@sairr.org.za

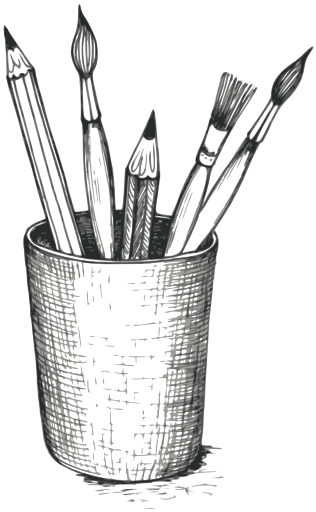
www.sairr.org.za

Investec
Tel: 011 286-7000 / Fax: 011 286-777

www.investec.co.za

Johannesburg Water
Tel: 011 688-1400 / Fax: 011 688-1528

www.johannesburgwater.co.za



Kantey & Templer
Tel: 021 405-9600 / Fax: 021 419-6774
Email: info@ct.kanteys.co.za

www.kanteys.co.za/careers/bursaries

Kumba Iron Ore
Bursaries in mining
Tel: 012 683-7000 / Fax: 086 295-0746
Email: Charmaine.naidoo@angloamerican.com / bursars@angloamerican.com

www.kumba.co.za/careers_bursaries.php

merSETA
Bursaries in engineering
Tel: 086 163-7738/010 219 3000
Fax: 011 484-5499
Email: bursaries@merseta.org.za

merSETA Social
@merSETASocial
www.merseta.org.za/SkillsDevelopment/LearningProgrammes/UniversityStudies.aspx

National Research Foundation
Scholarships and Fellowships Programme
Tel: (012) 481-4241
Email: studentsupport@nrf.ac.za

www.nrf.ac.za

Nedbank
Tel: 011 294-4444

www.nedbank.co.za/website/content/nedbursary/info.asp

PPS Bursary (The Professional Provident Society of South Africa)
Tel: 086 177-7146 / Fax: 011 644-4400
Email: info@pps.co.za

www.pps.co.za/pages/csi/scholarships.php

Rand Water Bursary
Tel: 011 682-0911 / 086 010-1060
Email: customerservice@randwater.co.za

www.randwater.co.za/PeopleandEmployment/Pages/Busaries.aspx

SAICA Thuthuka Bursary Fund
Accounting
Tel: 086 107-2422
Email: saica@saica.co.za

www.saica.co.za

SAICE Patrons' Engineering Bursary
Tel: 011 805-5947 / Fax: 011 805-5971
Email: fridah@saice.org.za

www.saice.org.za/services/spebs

Sasol Bursaries
Tel: 011 441-3111 / Fax: 011 788-5092
Email: Sonja@quest.co.za (Bursaries)
Email: learnership@sasol.com (Learnerships)

www.sasol.com
www.sasolbursaries.com/sasol_internet/frontend/bursary/bsr_index.jsp

South African Actuary Development Programme (SAADP)
Actuarial Science
Tel: 011 642-2200 / Fax: 011 486-1859

www.saadp.co.za

South African Weather Service
Tel: 012 367-6028/6016

www.weathersa.co.za/web/index.php/corporate/careers/bursaries

Standard Bank South Africa
Tel: 086 012-3000
Email: youth@standardbank.co.za

http://studentachiever.standardbank.co.za/youth/Career/Get-a-bursary

Tertiary School in Business Administration (TSiBA)
Bachelor of Business Administration
Tel: 021 532-2750 / Fax: 021 532-3924
Email: info@tsiba.org.za

www.tsiba.org.za

University of the Free State
Agri Bursary Scheme (Department Agricultural Economics)
Tel: 051 401-9054/401-9158
Email: Info@ufs.ac.za

Vodacom Bursary scheme
Tel: 011 653-5000
Email: externalbursars@vodacom.co.za

Vodacom
@Vodacom
Vodacom
Vodacom
www.vodacom.com/com/aboutus/vodacombursaryscheme

Water Affairs
Tel: 012 336-7748
Email: bursaries@dwa.gov.za

www.dwa.gov.za/LearningA/BursaryC.aspx

WesBank
Tel: 011 632-6000

www.wesbank.co.za

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