Science-Based CAREER FIELDS

SCIENCE TECHNOLOGY ENGINEERING MATHEMATICS

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Sources

Wikipedia.org • Careerexplorer.com

www.nstf.org.za | www.stemulator.org

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Introduction

Dear School Learner,

This book contains descriptions of careers and study fields in science, technology, engineering and mathematics (STEM). The careers and study fields are grouped into seven categories. This might help you to discover the career fields that you are interested in:

1. 4IR career fields (4IR = 4th industrial revolution)
2. Engineering career fields
3. Green career fields
4. Medical career fields
5. Mathematical career fields
6. Career fields that require creativity
7. Social science career fields

Look out for the **green font**, which shows you alternative names or specialisations hiding in the text.

Advice for Grade 9 learners at school

Don't be disappointed when you leave school after matric, and find that you cannot do the courses that will lead to the career you want.

If you want to study engineering or medicine, it is very important to take **mathematics** (not maths literacy) and **physical science** from Grade 10-12. Even if you just take mathematics and not science, there are many interesting university courses that you can study. Study hard in these two subjects in particular. Good matric marks in one or both of these subjects will open doors for you in future!

The STEMulator (a project of the NSTF/pro*SET*):

Visit **www.stemulator.org**, an online learning tool, to ***Explore>Discover>Learn*** about STEM in your world and read more on STEM careers and where to study.

We hope you will find this booklet useful to decide on which STEM studies and careers you want to pursue.

Kind regards
The **NSTF** and **STEMulator** teams

Symbols used in this publication

4th industrial revolution (4IR) career fields

The 4IR is all about the rapid advancements in technology and how it's changing the way we live, work, and interact with the world around us. There are already many 4IR careers, especially all those that involve computers or information technology (IT). The 4IR is about technology becoming so advanced that big data (huge amounts of data) can be stored and analysed by computer. Computers and robots can teach themselves – this is called artificial intelligence (AI). But humans create AI systems and humans must learn to manage AI so that it doesn't manage us. Green careers, medical careers and all branches of engineering are still relevant in the era of the 4IR. There are also careers that have not been invented yet, but will be necessary in future. Study hard and build your understanding of how all things work – that will be the best preparation for the future!

Engineering career fields

All branches of engineering are interesting and very useful. It is thanks to engineers that we have roads, bridges and dams, computers, automated machines, and even airplanes, cars and trains. The physical, human-made environment is designed and built by engineers. Engineering involves studying but is also about getting things done practically.

Green career fields

The crises faced by humanity, caused by the destruction of the natural environment and climate change, must be understood and resolved. Green' careers are those that help with the conservation of nature, ecosystems and global systems that are natural. Green careers include researching nature. All life sciences are regarded as green here. Green careers are also those that create a 'circular economy' – where waste is reduced and recycled. Green careers also include building a 'green economy' – where natural plants, animals and ecosystems are valued as much as money and products that are sold.

Medical career fields

All medical career fields remain relevant and important in the 4IR. The use of IT in medical fields and treatments has been increasing, and is now a part of medical study, research and practice. Pharmacology (the study of drugs, and the creation of new drugs) is an important medical field. Here too, IT has become an essential part of the field. Epidemics and pandemics are expected to break out more often, and therefore the sciences and practices needed to respond to them remain relevant.

Mathematical career fields

Here we look at career fields where maths plays a big role. Some of these careers include statistics. Maths can be studied and researched on its own (by mathematicians) or studied and researched as part of other fields.

Career fields that require creativity

There are certain career fields where creativity is needed, for example architecture (the design of buildings and other structures). However, creativity is part of the attitude you need to participate in 4IR career fields. Increasingly, careers demand problem solving, the ability to think of new ways of doing things, and the creation of new apps, programming, methods or products, etc. Being able to play an innovative role might be what makes the difference between unemployment and making a living by having your own business.

Social science career fields

Social sciences are those areas of study and research, where people and societies are studied. This includes the behaviour and problems of people, in groups or alone, and human social systems like those in politics and economics, etc. These are very important sciences because the implementation of scientific discoveries and technological innovation depend on people and society.

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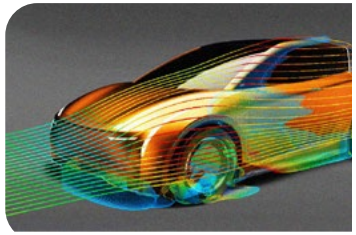
Table of contents

Aerodynamicist

Aerodynamics is the study of air movement when it interacts with a moving object and then uses that knowledge to design more efficient and high-performing vehicles and structures. An aerodynamicist does engineering work, such as designing, constructing and testing aircraft, missiles, and space craft.



Aeronautical engineer

Aeronautical engineers are specialists in planning, designing, developing, manufacturing and testing aeronautical products and systems (such as aircraft, missiles and satellites). Some tasks of **aeronautical engineers and technologists** include:

- aircraft structural and mechanical design and testing,
- designing and checking drawings of components,
- writing service bulletins for aircraft,
- interpreting oil and vibration analyses,
- drawing up test specifications and projected costs, and
- estimating and calculating many technical aspects (such as the fatigue life of structural components).

Aerospace engineer

Aerospace engineers design and develop aircraft, space craft, missiles and aerospace systems and components. They develop and conduct tests and computer simulations of aerospace vehicles, systems, and components. They prepare specifications for materials and processes to be used in aerospace manufacturing, maintenance, repair, or modification.

Agricultural engineers

Agricultural engineers, also known as **natural resource engineers**, apply engineering principles of science and technology, as well as knowledge of the agricultural practices to solve problems relating to sustainable agricultural production, the environmental impacts of intensive agriculture and the post-harvest handling of agricultural products.

Agronomist

Agronomy is the science of the successful growing of certain land crops, whether it is under dry land conditions or irrigation. The crops include corn, maize, grain sorghum, peanuts, sunflower, cotton, sugarcane, forage crops and fruit. Agronomists develop and implement production systems so that economical production is maximised without harming the environment.They investigate field crop problems and develop new and improved growing methods for higher yields or better quality.

Agricultural technician

Agricultural technology or agrotechnology (abbreviated agritech, AgriTech, or agrotech) is the use of technology in agriculture, horticulture, and aquaculture to improve yield, efficiency, and profitability. Agricultural technicians play a crucial role in supporting modern farming practices and ensuring the sustainable production of food and other agricultural products.

Air pollution analyst

Air pollution analysts are trained to research, inspect and investigate levels of air pollution, and take the necessary steps to ensure good air quality so that public health concerns are addressed. They conduct research, perform field and laboratory analysis to identify sources of environmental problems and recommend ways to prevent, control and remedy those problems.

Anaesthetist

Anaesthetists (**anaesthesiologists**) are medical doctors who help patients to lose consciousness (sleep) safely while they are being operated on, or undergoing a medical procedure. Anaesthetists are also responsible for intensive care medicine and pain management. They carefully monitor and maintain the patient's bodily processes (such as breathing, heartbeat, temperature, and fluid status) throughout the medical procedure, ensure that they return safely to consciousness and observe their recovery from the anaesthetic.

Animal husbandry specialist

Animal husbandry is the science of looking after and breeding animals, specifically those that are used in agriculture, to provide products for research purposes or as domestic pets. The animal husbandry specialist studies animals' habits, protect them from the predators, assist the animals with births and learn how to treat or prevent many ailments.

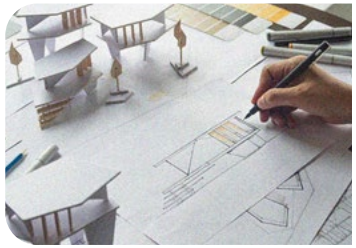
Archaeologist

Archaeology is the scientific study of people of the past. Archaeologists explore how people lived, where they lived, what they ate, and what their environment and culture were like. Archaeologists may be involved in three main areas of work:

- **fieldwork** (excavating or digging up areas such as ancient settlements, burial sites, tools, pottery and other material left behind by past human activities)
- **laboratory work** (cleaning and examining the items found)
- **interpretation, analysis and writing** (taking all the information found at the excavation site, trying to further understand it, using historical information and knowledge of the people of various regions).

Architect

Architects plan, design and decorate buildings and the environment around us (interiors, furnishings and gardens). They design buildings to be strong, convenient and attractive. Architects discuss the requirements and costs of a building project with clients. They consult with **quantity surveyors, engineers and project managers.** They then make sketches, design models, and produce project documents and cost estimates. Once the building plans are approved by the authorities, the architect manages and supervises tendering and building processes.



Astronomer

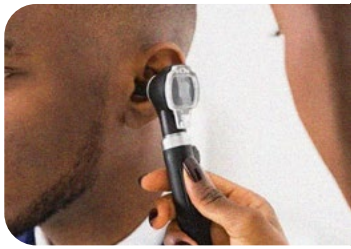
Astronomers use their knowledge of **mathematics and physics** to study the universe. They research the properties, origins and evolution of astronomical objects such as galaxies, stars, planets and comets, and develop ways to explore space. Most astronomers work in either the observational or theoretical fields of astronomy. **Observational astronomers** study celestial objects by observing them directly through telescopes or by using radio waves (called radioastronomy). **Theoretical astronomers** develop theories on facets of the universe. Astronomy is an ever-evolving field that continues expanding our knowledge of the universe.

Astrophysicist

Astrophysicists study the physical properties and behaviour of celestial objects. Astrophysics is the branch of astronomy that deals with the physics of the universe, including the physical properties of celestial objects, as well as their interactions and behaviour. As an academic subject, astrophysics is a combination of physics and astronomy. Astrophysicists investigate the processes and interactions that occur in space, applying the principles of physics to explain astronomical phenomena.

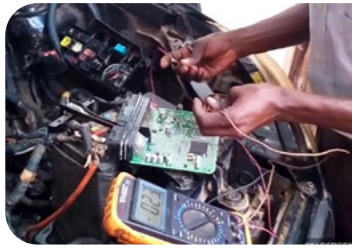
Audiologist

Audiologists help people who have hearing, balance, and related ear problems. Using various types of testing equipment, audiologists measure patients' ability to hear and distinguish between sounds. They fit hearing aids and provide auditory training (improving the benefits of hearing aids); perform research related to hearing problems; and evaluate hearing and speech/language disorders to determine diagnoses and courses of treatment. They administer hearing or speech/language evaluations, tests, or examinations to collect information on the type and degree of impairment, using specialised instruments and electronic equipment.



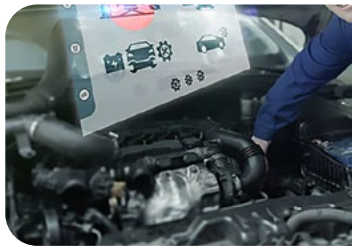
Auto electrician

Automotive (or auto) electricians are specialised automotive technicians who diagnose, repair and maintain the electrical and electronic components in vehicles. Among their tasks is diagnosing electrical problems in a vehicle, eg. malfunctioning lights, power windows and problems with computer systems. They repair or replace damaged wiring and electrical circuits, and maintain or replace faulty batteries. Their expertise is crucial in ensuring the proper functioning of a vehicle's electrical systems.



Automotive machinist

Automotive machinists are skilled professionals who work on engines and engine components. They use precision machining techniques to repair, rebuild and customise engines to ensure that they perform optimally. They work mainly with metals in specialised machine workshops or automotive repair facilities.

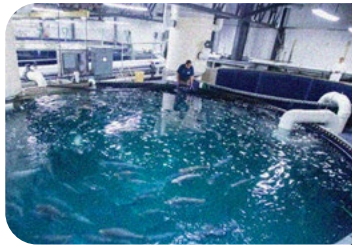


Arachnologist

Arachnologists are scientists who study arachnids, a group of joint-legged invertebrates that includes spiders, mites, ticks, and scorpions. They are experts in understanding the biology, behaviour, ecology and taxonomy of these fascinating creatures. They collect specimens of arachnids from various habitats, identify, describe and classify new species, and study their ecological role and behaviour among other things. Arachnologists are concerned with the conservation of arachnid species, especially those that may be endangered or threatened due to habitat destruction or climate change Arachnologists' work contributes to biodiversity conservation, pest management, and other areas that benefit the natural world and human wellbeing.

Aquaculturist

Aquaculturists, also known as **aquaculture farmers**, specialise in the cultivation and management of organisms that live in water, in controlled environments such as ponds, tanks or ocean enclosures. Aquaculture is the practice of breeding, rearing and harvesting fish and shellfish such as shrimps, clams, lobsters or oysters, and aquatic plants for food production, conservation and research. Aquaculturists help meet the increasing demand for seafood while reducing pressure on wild fish populations.



Avionics engineer

Avionics engineers specialise in designing, developing and maintaining the electronic systems used in aircraft and spacecraft. They work on systems such as flight control, navigation, communication, and radar systems, and electronic displays in the cockpit. These electronic systems, collectively known as avionics, are crucial for the safe operation of modern aircraft and space exploration.

Biochemist

Biochemistry is a basic science that deals with the building blocks and components of living organisms, as well as their functioning and physical qualities. Biochemists study the chemical basis of life, exploring the intricate processes that drive biological systems. They provide valuable insight into how living systems work. Their work spans various fields, from medical research to agriculture and biotechnology. They contribute to our understanding of living organisms and the development of innovative solutions for human health and well-being.

Biofuels researcher/scientist

Biofuels researchers/scientists are involved in the study and development of biofuels. These fuels are renewable energy sources derived from organic materials such as plants, algae and waste material. They play a big role in advancing and developing environmentally friendly and sustainable alternative sources to fossil fuels so that the human carbon footprint can be reduced.

Biokineticist

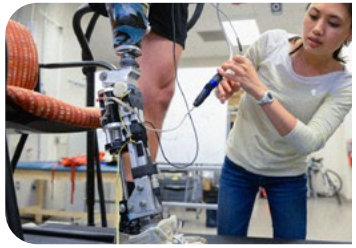
A biokineticist is a specialist therapist in exercise and human movement. Biokineticists identify which exercises are best suited to the individual and assess their fitness and physical capacity for work. They use scientific methods and instruments to assess a person's physical condition, considering their heart and respiratory systems, posture, muscle and joint strength and flexibility, and speed and co- ordination of movement.

Biologist

Biology is a basic science. Biologists study humans, plants, animals and the environment. They investigate more about the world by looking at how life begins and develops, as well as the structure and function of life, collecting specimens from the natural environment where the plant, animal or insect lives. These collected specimens are then carefully examined, named and classified (if it is a new discovery). The findings are recorded and finally written up in reports or academic journals. Many biologists specialise in a specific field of study, such as **zoology** (animal life); **botany** (plant life); **microbiology** (microscopic plant and animal life); **entomology** (insect life) etc.

Biomedical engineer

Biomedical engineers apply engineering principles and techniques to the fields of biology and medicine. They design medical equipment to diagnose and treat health problems, such as scans and ultrasound machines to see inside the body without surgery. Biomedical engineers study and do research on human biology. They develop ways to analyse, improve and adapt medical and computerised equipment and treatment programmes. They use tests to make sure the electronic, electrical and mechanical equipment used to diagnose, treat and monitor patients are safe and effective. The also create mechanical devises to improve mobility and functionality for individuals with disabilities of injuries.



Biostatistician

Biostatisticians are experts in applying statistics to health-related fields. They consult with other researchers to design studies for answering questions about health. Biostatisticians use their knowledge of research methods to help plan, choose and carry out the study most useful for answering the questions at hand. They analyse the results of the study and may also use their expertise to design new ways of doing research.

Biotechnologist

Biotechnologists use living cells, the products of cells, and micro-organisms (tiny living things) to make a variety of products and processes that benefit us. Biotechnologists often work in: **manufacturing; the medical field** (curing disease, helping to develop medicines and other treatments); **the environmental field** (finding organisms that can be used in recycling, or which can break down and remove poisons from manufacturing or other waste); or **agriculture** (working with plants or animals). Their work focuses on harnessing the power of biology to improve our world.

Botanist

Botanists are biological scientists who study plants, including their structure, physiology, evolution, ecology, classification and interaction with the environment. Botany is a very broad basic science. It encompasses the study of more than 300 000 species of plants. Botanists usually specialise in one type or group of plants, or one approach to the study of plants. Botanists are often classified according to the types of plants that they study. For example, **agronomists** specialise in the study of agricultural crops and grasses, while **marine botanists** study plants that grow in the ocean.

Cartographer

Cartographers design, create and produce maps. They are involved with the scientific, technological as well as the artistic aspects of developing and producing maps. Cartographers play a crucial role in visualising geographical and spatial information in a clear and accurate manner. Their work involves various tasks and responsibilities related to map production, interpretation, and data visualisation.

Cardiologist

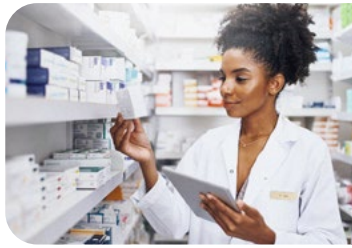
Cardiology is a branch of medicine that deals with the disorders of the heart as well as some parts of the circulatory system, called the cardiovascular system. A cardiologist is a medical doctor who specialises in the diagnosis, treatment and prevention of diseases related to the cardiovascular system. Some key aspects of what cardiologists do, are diagnosing and treating congenital heart defects, coronary artery disease, and heart failure; managing heart conditions, prescribing medications and overseeing rehabilitation programmes designed to improve heart health. Some cardiologists specialise in interventional cardiology, where they perform procedures like angioplasty (a procedure to widen arteries or veins) and stent placement to open blocked arteries and restore blood flow to the heart. **Electrophysiologists** are cardiologists who specialise in the diagnosis and treatment of heart rhythm disorders (arrhythmias).

Chemical engineer

Chemical engineers use their knowledge of chemistry to solve practical problems concerned with turning raw materials into valuable products, perform chemical plant design and construction. They may also invent new ways of doing things. Chemical engineers have contributed to the fields of **atomic science, manufacturing, mineral processing, paper, dyes, medication, plastics, fertiliser, foods, environmental protection** and **fuel**.

Chemist

Chemistry is a basic science. Chemists analyse the scientific properties of different types of matter to create, improve and test products for commercial and research purposes. They may focus on making new products, such as synthetics, paints and pharmaceutical products. They may also be involved in testing and analysing current products to help improve them. **Some chemists work in the production industry**, deciding how certain materials and chemicals should be handled properly and safely. Chemists often write instructions for factory workers on which ingredients to mix, how much of each to use, and how long they should wait for the mixture to be ready to use. **Some chemists work as inspectors,** testing samples to make sure that they meet the standards set by industry and government.



Civil engineer

Civil engineers plan, design, supervise, manage and maintain large construction projects. **They can specialise in construction:** building roads, stadiums, airports, tunnels, dams, bridges and water supply and sewage systems. Civil engineers consider many issues in the design process, from construction costs and expected lifetime of a project, to government regulations and possible environmental difficulties (such as earth tremors). Civil engineering and technologist work may also involve **research, testing, production** or **maintenance**. Many technological conveniences, so taken for granted in modern society, are maintained, implemented and designed by those trained in civil engineering and by technologists.

Climate change analyst

Climate change analysts evaluate changes in climate data and what impacts these changes may have on natural ecosystems and civilisations. They evaluate both the economic and physical impacts of such changes.

Climate scientist

Climate scientists study Earth's climate, which is weather conditions over vast areas, averaged over a period of at least 30 years. They collect scientific data and carry out **research on the climate**. Climate data often includes: atmospheric temperatures, ocean conditions, ice masses and greenhouse gases. Climate scientists use this data to create models and to predict probable changes in the earth's climate in the future. Climate science, or **climatology**, is part of the **atmospheric sciences** and a **subdivision of geography**, which is one of the **Earth sciences**. Climatology includes some aspects of **oceanography** and **biogeochemistry**.

Computer engineer

Computer engineers apply the principles of both computer science and electrical engineering to design, develop and improve computer hardware and software systems. They design and implement computer networks, including wireless networks, to enable communication and data exchange between computers and devices. Computer engineers contribute to the advancement of technology, enabling the development of modern computer systems, mobile devices, embedded systems, artificial intelligence, and much more.

Computer programmer

Computer programmers create, modify and test the forms, scripts and code that tell the computer what to do. They serve as a link between the operator and the computer. The work of computer programmers is both demanding and rewarding. In general terms, they are people who write programs for specific purposes or needs, for example to create a virtual reality game; a database system to control machinery; or to programme a company's telephone system.

Computer scientist

Computer scientists take a scientific approach to researching and solving complex problems within the field of computing, and create innovative ways of tackling challenges in fields such as **robotics** and **artificial intelligence**. **Designing and building software** is another area of work, as is **developing new programming languages** and working with **hardware design**. Developing the latest and most effective ways for computers to solve users' problems.

Computer security specialist

Computer security specialists help businesses, educational institutions, and government organisations to control access to their computer networks and protect important data stored there. They implement application access controls, such as password authentication, or biometrics (physiological characteristics of a person, e.g., fingerprint, face or voice recognition) that keep unauthorised users from accessing a particular computer, gadget, network or program. Also known as **information security** or **cyber security specialists**, they take steps to deny hackers access to a system and set up programs that detect hackers when they do intrude into a system. They may also be responsible for controlling site-specific physical access to computers.

Computer software engineer

Computer software engineers apply the principles and techniques of computer programming, engineering and mathematical analysis to the design, development, testing and evaluation of the software and systems that enable computers to perform their many applications. The major part of their work is, however, developing algorithms and analysing and solving programming problems.

Computer systems engineer

Computer systems engineers are essential for maintaining the functionality and reliability of computer systems and networks within organisations. They design, develop and manufacture circuit boards used for interfacing computers to other equipment and sometimes write software for controlling computer operations. They are responsible for implementing security measures to protect computer systems from unauthorized access, data breaches and cyberattacks. Among their other tasks they are responsible for developing disaster recovery plans and backup strategies.

Conservation scientist

Conservation scientists are responsible for designing and implementing programmes for the management and conservation of bio-diversity that rely on natural resources for their operations, e.g. game reserves, helping them to organise their activities in ways that least damage the environment and take active steps to save animal and plant populations that are under threat.

Criminologist

Criminologists are social scientists who study crime, criminal behaviour and the systems which bring people accused of crimes to justice. They attempt to explain the reasons for criminal behaviour and suggest ways of reducing crime. They study the ways in which the law courts, police services, prisons and community-based corrections centres can be most effective. Criminologists analyse and interpret data received on the incidence of crime and the operation of the justice system. They are therefore able to provide information about crime and the criminal justice system. They play an important role in advancing our understanding of crime and its impact on society.

Database administrator

A database is a collection of information that is electronically stored and organised. Database administrators work to ensure that this data is handled correctly, and that the database is running properly, that data is organised and sorted correctly, and that the information is accurate. They also need to ensure that the data is constantly available, and the database is kept running smoothly. In addition to this, they have to ensure that the stored details and records should only be accessed by authorised people. Database administration is technical work, which is done at a business's office site, using computers and database software.

Data Scientist

Data scientists use a combination of statistical, programming and domain knowledge to analyse and interpret complex data sets. Extracting valuable knowledge from large data sets helps organisations to make data-driven decisions and solve complex problems. Data science uses techniques and theories drawn from many fields such as mathematics, statistics, computer science, information science, and domain knowledge. Data mining techniques help to discover patterns and trends in huge data sets (called big data). Data scientists can work in various industries, including **finance, technology, healthcare, e-commerce and marketing**.

Dermatologist

Dermatologists are medical doctors who specialise in diagnosing and treating skin diseases and conditions such as acne, eczema, or psoriasis. They examine specimens under a microscope, and make various chemical and biological analyses and perform other tests to identify disease-causing organisms or pathological conditions. They prescribe and administer medication, and apply superficial radiotherapy and other localised treatments. A dermatologist also treats abscesses, skin injuries, and other skin infections, and surgically removes malignancies of the skin, cysts, birthmarks, and other growths.

Demographic analyst

Demographic analysis is the study of populations in a given sector. Companies often conduct demographic analysis to judge the relative sensitivities of a target market. This allows them to tailor their advertising and general presence to the needs of a given community.

Dietician

Dietetics is a challenging, varied career for people who are interested in and enjoy both science and working with people. **Clinical dieticians** manage food service systems for institutions (such as hospitals and schools). Dieticians in food service management positions supervise large-scale planning and preparation of meals in **health care facilities, government departments, company cafeterias, prisons, schools, orphanages,** and **homes for the elderly. Therapeutic dieticians** plan special diets for people, based on the doctor's prescription. **Educational dieticians** lecture at tertiary learning centres and train catering staff. **Community dieticians** work for government health authorities, educating people on healthy eating habits and planning nutritional policies and ways to carry out and monitor them. **Consulting dieticians** work in private practice as consultants to health care facilities, medical doctors, and the public.

Diesel mechanic

Diesel service technicians and **mechanics** (also known as **diesel technicians**) inspect, repair, and maintain diesel-powered vehicles and equipment. They work with a wide range of diesel engines, including those in **trucks, buses, construction equipment, agricultural machinery, generators and ships**.

Ecologist

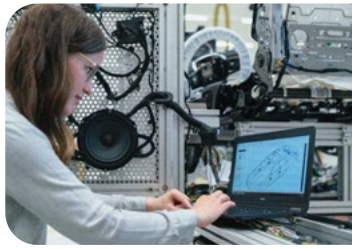
An ecologist is a scientist who studies how organisms (animals, plants, microbes, etc.) interact with their environment and each other. Ecologists investigate ecosystems, including the relationship between living organisms (such as plants and animals) and their physical surroundings (such as soil, water, climate, etc). Ecologists often do field research to gather data. They analyse the information to learn more about the patterns and processes that shape ecosystems. Ecologists may specialise in various sub-disciplines such was **marine ecology, terrestrial ecology**, and **conservation ecology**. Their work is essential for us to understand the natural world and the impact our activities have on the environment.

Electrical engineer

Electrical engineers design, develop and maintain electrical control systems, components and devices. They supervise their manufacture to required specifications. They use their knowledge of physics, mathematics and electronics to solve problems related to the generation, transmission and distribution and use of electric energy. The range of activities common to many posts filled by electrical engineers is likely to include identifying customer requirements; designing systems and products; reading design specifications and technical drawings; researching suitable solutions and estimating costs and timescales. They play a vital role in society by designing, developing and maintaining electrical infrastructure that powers our homes, industries, communication networks, transportation systems, etc.

Electronics engineer

Electronics engineers are concerned with the generation, transmission and processing of information and includes computers, software, transmission networks, telephones, radio, television, signal processing and optics. They work with a wide range of electronic technologies, from microchips and integrated circuits to complex electronic systems used in industries. They play an important role in advancing technology in industries such as **telecommunications, medical devices, aerospace, etc.** and improve the efficiency and functionality of electronic devices we use every day.



Environmental compliance inspector

They inspect and investigate sources of pollution to protect the public and environment and ensure conformance with provincial and national government regulations and ordinances. They may be expected to conduct research on hazardous waste management projects in order to see how big the problems are, or to determine treatment or disposal alternatives and costs. They must determine the nature of violations and actions to be taken, and issue written notices of violation; participate in enforcement hearings as necessary; and determine which sites and violation reports to investigate. They could also be required to investigate complaints and suspected violations regarding illegal dumping, pollution, pesticides, product quality, or labelling laws. They are required to monitor follow-up actions in cases where violations were found, and review compliance monitoring reports. In some cases, they are also responsible for performing laboratory tests on samples collected, such as analysing the content of contaminated wastewater.

Environmental engineer

Environmental engineers design, plan, or perform engineering duties in the prevention, control, and remediation of environmental health hazards, utilising various engineering disciplines. have to prepare, review, and update environmental investigation and recommendation reports. They collaborate with **environmental scientists, planners, hazardous waste technicians, engineers**, and **other specialists**, and **experts in law and business** to address environmental problems. It is also the duty of environmental engineers to obtain, update, and maintain plans, permits, and standard operating procedures. These engineers provide technical-level support for environmental remediation and litigation projects, including remediation system design and determination of regulatory applicability. They also advise corporations and government agencies of procedures to follow in cleaning up contaminated sites to protect people and the environment.

Environmental chemist

Environmental chemists are responsible for analysing the effects of chemicals on soil, air and water environments. They are also responsible for devising solutions to environmental problems. Their main aim is to locate and neutralise threats of pollution to people, animals and plants, using their knowledge of chemical properties and reactions.

Environmental scientist

Environmental science is a multidisciplinary field that integrates physical, biological and information sciences (including ecology, biology, physics, chemistry, zoology, mineralogy, etc.) to the study of the environment, and the solution of environmental problems. Environmental scientists usually specialise in a particular aspect of the environment, such as **land conservation, hazardous or toxic waste removal** and **disposal, groundwater contamination, acid rain**, or **wildlife preservation**. They may do **environmental impact studies** or design **monitoring systems**. Others may work with civic groups and political leaders to solve environmental problems in the community. Their work may involve preparing for and attending public hearings or appearing before legislative committees or in court on environmental issues.

Epidemiologist

Epidemiologists are public health researchers who study the health of the population by collecting data and analysing statistics to identify the cause of ill health in the population and determine how it can be prevented. They look at medical, social, environmental and economic factors when determining the cause of problems. Epidemiologists carry out or oversee professional, epidemiological investigative work by assisting in the design, conducting and analysis of epidemiological investigations for disease surveillance and special studies.

Relevant to pandemics

Food scientist/technologist

Food scientists use their knowledge of chemistry, physics, engineering, microbiology and biotechnology to find better ways of making and storing food without destroying its nutritional value. They analyse food to calculate its nutritional value (such as the information on fat, vitamins, and protein that is found on food packaging) and to check the quality and hygiene of food to make sure that it's safe to eat. A big part of a food scientist's work involves research, e.g., looking for less harmful additives to preserve food, and finding ways to improve the flavour, texture and colour of food or enhance ways of preparing food. They may also help to create new methods of **packing and storing food,** so that it will last longer. Food technologists use the information uncovered by the research of food scientists and apply this to develop new food products.

Forensic scientist

Forensic scientists investigate evidence gathered from a crime scene. Using scientific methods, including an understanding of chemistry and biology, they can piece together what happened at a crime scene. They play two main roles, namely, to **analyse evidence** and to **testify in court**. The analysis of evidence typically includes **toxicology** (examining blood and body fluids for evidence of drugs and poisons); **biology** (DNA extracted from samples of body fluids and hair); **chemistry** (examining traces of blood, soil and paint); document examination; weapons; and finger- printing. Testifying in court includes explaining the results to the judge and legal team, and helping to link this to the suspect in order to assist the law in prosecuting the guilty parties.

Forester

Foresters manage, develop, and protect forest lands and resources. Most foresters perform duties related to the protection and improvement of forest lands. Foresters advise landowners on forestry management techniques and conduct public education programmes on forest care and conservation. They may also participate in **environmental studies, prepare environmental reports, patrol forests**, and **enforce laws**.

Game designer (Multimedia)

Game designers invent, build, produce and promote computer games. Game design is like being a film director for a computer simulation. They are creative thinkers in the development of a game, and they become the story tellers in how the game is to be played. They produce the game design document and develop games for educational, entertainment or computer platforms.

Geneticist

Genetics is the study of genes, DNA, heredity, and genetic variation in living organisms. Geneticists research the genetic causes of and possible gene therapies for diseases and disorders that result from a single genetic mutation or a combination of genetic traits. Some geneticists focus on isolating the gene or genes responsible for certain diseases and conditions in which the causes are not fully determined or understood. Additionally, geneticists provide **genetic counselling** where they help people understand the risk of inherited diseases and provide guidance on family planning.

Geographer

Geographers study the earth's surface and its various aspects, including its physical features, climate patterns, natural resources, and the way in which humans and the natural environment interact. They aim to understand how society works and how important the environment is to maintaining and developing life on earth. Most of the key decisions that have to be made in a country like South Africa, such as decisions about housing, migration, the environment, alternative energy sources, the economy, sustainable urban and rural development and natural disaster management, to name a few, must be informed by geographers.

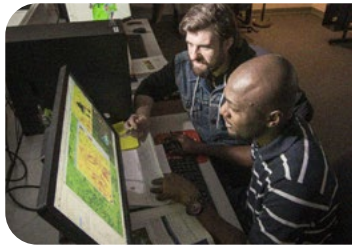
Geologist

Geologists study the composition, structure and history of Earth. They are experts in "earth processes." Geologists often conduct field surveys to collect rock samples, and study geological formations. They interpret the data obtained from that sampling and measuring, and prepare reports of the field work. These samples might range from a simple soil test to a test of sample cores taken from the bottom of a tropical ocean or from beneath the polar ice caps. Geologists assess the potential for natural resources such as gas, minerals, water and oil in specific areas. Engineering geologists deal with the technical analysis of the factors related to the earth. They determine and assess various geological hazards such as **landslides, earthquakes** and **volcanic eruptions**.

Geophysicist

Geophysicists study the physical structure and behaviour of the earth using highly sophisticated instruments. Geophysicists often work in the fields of mineral or oil mining, where they look for signs of oil, mineral and gas deposits, without having to drill into the earth. They often form part of a team of geologists and engineers, and plan and carry out land and marine surveys. Geophysicists must often investigate a land or marine area that is being developed to ensure that it is suitable. There are also opportunities for geophysicists in **seismology**, and the **monitoring of fault lines, earthquakes and tectonic plate movement**. Geophysicists may also **monitor volcanoes and glaciers**, or use their tools to help **predict ocean tides and currents**.

Geographic information systems (GIS) specialist



GIS specialists use specialised computer programmes and software to create maps or graphs. They work with a wide range of data sources including satellite imagery, aerial photographs, survey data and GPS data to create these detailed maps. The maps they create and analyse contain information on political borders, transportation networks and environmental resources among others. They are employed in fields such as **urban planning, environmental management, disaster management**, and **transportation**.

Gynaecologist

Gynaecologists are medical doctors who specialise in women's health and reproduction. They care for and treat women during their pregnancies and post-natal periods; and sometimes have to perform surgical procedures to ensure that babies are safely delivered. They perform regular examinations and screenings to test for issues such as cervical cancer. They offer counselling on birth control and family planning, and assess fertility concerns.

Hydrologist

Hydrology is a field of study that focuses on the management of water. A hydrologist makes an accurate assessment of the available water and future needs and makes recommendations on long term management practices.

Immunologist

Relevant to pandemics

Immunologists are **medical** or **biological scientists** who study the immune system and its response to diseases and infections. The immune system plays an important role in defending our bodies against pathogens like bacteria, viruses and parasites, as well as abnormal cells like cancer cells. Immunologists study the complex processes of the immune system to better understand how it functions and can be used to prevent infections and diseases.

Industrial engineer

Industrial engineers are responsible for the design, implementation, operation, improvement and management of high-level systems, processes and resources in various industries. Industrial and manufacturing engineers apply the principles and techniques of engineering, mathematics and management to analyse and streamline production and manufacturing systems.

IT systems administrator

IT systems administrators make sure that the computer systems of a business are running properly, monitoring the efficiency of servers (the central computers that all others connect to), as well as installing, maintaining and upgrading the system. The systems administrator must also ensure that the computers, servers, network and software all work properly together. Systems administrators need to be well organised and have an eye for detail, so that they are better able to identify any potential problems in the system. Once an issue has been spotted, the systems administrators then need to have good problem-solving skills, so that they can correct efficiency concerns or solve other types of problems.

IT technician

Information technology (IT) technicians (also known as **IT repair technicians**) repair, maintain and upgrade computers. IT technicians need to have a knowledge of electronics and be very familiar with the hardware components of computers and how they work. As part of their work, they need to be able to use problem-solving techniques, and run tests and diagnostics to work out where problems lie. IT technicians also need to be familiar with different software operating systems such as Windows, Unix and Mac. They need to keep up to date with the latest hardware and software, and often have to attend training courses to learn about new technologies.

Lecturer

Lecturers teach tertiary level students at universities, universities of technology, colleges and other institutions, with a set study course in one or more fields. They also conduct **research projects** and evaluate performances with individual students and discuss areas of performance.

Marine biologist

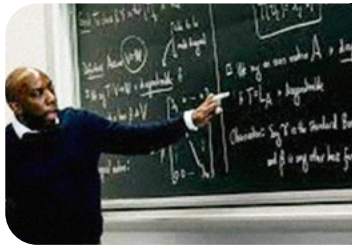
Marine biology is a diverse science concerned with all aspects of plant and animal life in the sea. They study the distribution, abundance and life histories of animals and plants in the sea and the way in which these are governed by environmental factors. They are concerned with the effects of pollution on marine life. They assist in determining the ecological effects of projects such as the construction of harbours or prospecting for minerals.

Materials scientist

Materials scientists study the structures and properties of various materials such as metals, alloys, ceramics, semiconductors and polymers. The purpose of these studies is to understand and characterise materials and to develop new materials with improved characteristics, which will be of commercial and scientific benefit. One of the tasks of materials scientists is to investigate why certain materials underperform or fail, and to recommend improvements to prevent similar problems in future. Some materials scientists work with nanomaterials. See **Nanoscientist**.

Mathematician

Mathematicians analyse mathematical problems. Mathematics can be studied for its own sake, however, it is very useful in finding solutions for problems in the **fields of industry, engineering, agriculture, ecology, finance** and **medicine**. Mathematicians can work for governments and in private research companies. **Applied mathematicians** often work in teams with engineers, scientists, economists and other professionals to provide data and feedback. They create new mathematical formulas and principles, applying them to problems, or determining how a practical problem can be broken down into a mathematical formula. **Theoretical mathematicians** often teach at university level. They may also do independent **research work**.



Mechanical Engineer

Mechanical engineers research, develop, design, manufacture and maintain a variety of machines. Using the concepts of thermo-dynamics, fluid mechanics, mathematics and mechanical design, mechanical engineers create machines that both use and produce power.

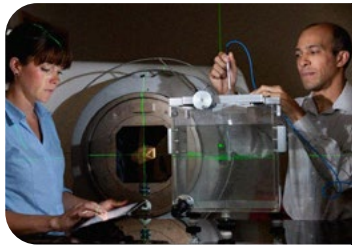
Mechatronic engineer

Mechatronics engineers apply the principles of mechanics, electronics and computing to create smart machines that are able to interact with their environment. Mechatronics engineers work in all aspects of the development of smart machines, from design and testing to the manufacture of smart systems and products. Advances in artificial intelligence (AI) mean that robots can now simulate the behaviour of humans by making decisions as they interact with their environment. Mechatronics engineers are at the cutting edge of designing human-machine interaction in various industries.

Medical doctor

A medical doctor is a professional who has completed the necessary education and training to diagnose, treat, and prevent illnesses and injuries in individuals. Medical doctors are also called **physicians**. They provide essential medical care, prescribe medication, perform surgery, and offer preventative measures to help people maintain their health. **They may also conduct research, educate patients and the public,** and work collaboratively with other health-care professionals to ensure the best possible outcomes for their patients.Doctors are committed to lifelong learning and must stay updated with the latest medical advancements and research. They attend conferences, engage in continuing medical education programmes, and read scientific literature to ensure they provide the best possible care to their patients. Doctors can opt to be **general practitioners (GPs)** or specialise in one of several fields, such as **neurology, urology, radiology, obstetrics and gynaecology, internal medicine, dermatology, paediatrics, psychiatry**, etc.

Medical physicist



Medical physicists work towards treating diseases and improving health care by applying physics to medicine. Medical physicists frequently collaborate with physicians treating cancer patients to determine plans for radiation treatments. They also spend considerable time working toward improving equipment and treatments for diseases, including cancer and heart disease. They investigate the role of computers and technology in treating patients and how improving technology can help with imaging for improved diagnosis of conditions. Medical physicists also look at the biological functions of the body, working with this information and technological advances to discover new treatments or improve treatments already in use.

Metallurgist

Metallurgists are concerned with the physical and chemical behaviour of metals and alloys. Metallurgists may specialise in **chemical, physical or process metallurgy** and this determines the type of job they do. Chemical metallurgists are involved in the extraction of metals from ores, and they study metal corrosion and fatigue. Physical metallurgists monitor the behaviour of metals under stress and study changes in metals under different temperatures. Process metallurgists shape and join metals and select the best metal for the job. Work may be in **research and development, design and manufacture**, or **production management** and **quality assurance**.

Meteorologist

Meteorology is the study of the atmosphere. Meteorologists analyse and study weather conditions. A **research meteorologist** studies more specific areas of weather like severe weather or climate change. They can also develop tools like radar or weather models. They apply various mathematical formulas and other complex scientific techniques to forecast weather conditions. They also safeguard air travellers by warning

against any potential threats that may occur due to adverse weather changes. Other working activities are aimed at in-depth research and data collection from satellite images, radar, remote sensors and weather stations all over the world. The duties of a meteorologist include coordinating information and investigating subjects like the physics of clouds, changes in rainfall, humidity and the relation between abrupt climatic changes and global warming.

Microbiologist

Microbiologists investigate the growth, structure, development, and other characteristics of microscopic organisms, which are tiny living organisms that are too small to be seen with the naked eye. Microorganisms include bacteria, algae, viruses and fungi. Microbiologists work in a wide variety of settings, although most of the work is laboratory-based. Microbiologists isolate and make cultures of microorganisms, identify their characteristics, and observe their reactions to chemicals and other kinds of stimuli. They also study how microorganisms develop and reproduce, as well as their distribution in nature. Many microbiologists work for universities, where they teach and do research. Others work at medical centres, in private industry, or for government agencies. Their work helps us understand how microorganisms influence our lives, from causing diseases to offering solutions to challenges in medicine, agriculture and environmental management.

Mining engineer

Mining engineers are experts in mining, engineering (rock, civil, mechanical and electrical engineering), geology, mine ventilation and surveying. Mining engineers work together with geologists, mine surveyors and metallurgical engineers to find, assess viability, and mine new ore deposits. They also develop and manage new mining equipment and processes, carry out research on mining-related and environmental issues, and

work towards improving working conditions on the mine and the health and safety of the workers. Although mining engineers usually spend most of their time in the office, they also visit mining sites to supervise projects.

Mobile application development

Mobile phones have become as important as our wallets and purses in everyday living, and development in this area is moving at a very fast pace. Mobile application (app) developers produce application software for low power handheld devices, such as mobile phones.

Nanoscientist and nanotechnologist

Nanoscientists and nanotechnologists study, design, develop and supervise the production of materials, devices and systems at nanoscale (where a single unit is between 1 and 100 nanometres. One nanometre = 0.000001 millimetres). Nanoscientists and nanotechnologists apply principles of nanoscale physics and electrical, chemical and biological engineering. Nanotechnology, often shortened to **nanotech**, is the use of matter on atomic, molecular, and supramolecular scales for industrial purposes.

Nematologist

Nematologists are scientists that study nematodes, which are also called roundworms. They research various aspects of nematodes, including their biology, ecology, behaviour, and the interactions they have with other organisms and the environment. Some nematologists identify and study the nematodes in the soil to help farmers grow enough healthy food for everyone. A plant and soil nematologist extracts nematodes from samples they take from different environments. Nematologists use microscopes and can identify and count the nematodes found in the soil and plant material. Nematologists' role is important for understanding the role of nematodes in ecosystems, agriculture, and human and animal health.

Network administrator

Network administrators are responsible for making sure that computer networks are running correctly. The network administrator has to take care of the administration, management and maintenance of a computer network. They also control who has access to the server (or central computer) and manage upgrades and the installation of new software. They need to have excellent knowledge of various operating systems (such as Windows and Linux).

Neurologist

Neurologists are medical doctors who specialise in diagnosing and treating diseases and conditions of the nervous system. The nervous system includes the brain, spinal cord, nerves and muscles. Neurologists examine the nerves of the head and neck, the strength and movement of muscles, balance, reflexes and sensation. They also test cognitive abilities, such as memory, language and speech. They order and interpret diagnostic tests, such as magnetic resonance imaging (MRI) scans, MRA scans, electroencephalograms (EEGs), computed tomography (CT) scans and lumbar punctures. These tests allow a neurologist to prescribe medication and drugs to treat the diseases. Neurologists often work in teams with other specialists such as **radiologists, neurosurgeons** and **psychiatrists**.

Nuclear engineer

Nuclear engineers design, develop and operate systems that harness nuclear energy for various applications. Nuclear energy is released when the atomic core is split. Many nuclear engineers are involved in nuclear power generation where they design and maintain nuclear energy reactors that produce energy safely and efficiently. Nuclear engineers also play a big role in the nuclear medicine field. Radioactive materials are used to diagnose and treat cancer. Nuclear energy is also used for sterilisation, pest control and the production of fertilisers. Additionally, nuclear engineers also do **genetics** research to improve food strains and their resistance to harmful elements.

Nuclear medicine technologist

Nuclear medicine technologists prepare, administer and measure radioactive isotopes in therapeutic, diagnostics and tracer studies. They gather information on patients' illnesses and medical history to guide the choice of diagnostic procedure for therapy. They administer radiopharmaceuticals or radiation to detect or treat diseases, using radioisotope equipment, under the direction of a physician (a medical doctor). The computer-generated or film images they produce are then interpreted by the physician.

Occupational health and safety specialist

Occupational health and safety (OHS) specialists are responsible for ensuring that workplaces comply with health and safety regulations to provide safe work environments. They specialise in certain areas. For example, **environmental protection officers** assess programmes that impact the environment, such as the storage and handling of hazardous waste. **Health physicists** know how radiation interacts with living beings. They monitor the manufacture, handling, and disposal of radioactive material. **Industrial hygienists** test the workplace for health hazards such as asbestos, pesticides, or communicable diseases. Although there are several specialties within this field, every one of them is concerned with identifying hazardous conditions that affect workers, property, the environment, and the general public. A thorough survey is conducted in the workplace to test equipment, pollutants, potential accident and health hazards, and observe workers and equipment. Once the hazard is determined, they focus on ways to eliminate it. They also help companies develop new safety practices and conduct training sessions for management.

Oceanographer

Oceanographers are scientists who study the sea to understand oceans and the living creatures within them. Oceanography is the study of the sea and all its different facets, such as the sea floor, marine life, ocean currents, the physical

and chemical composition of the water and the air above the ocean. **Oceanographers also study waves; geophysical fluid dynamics; plate tectonics** and the **geology of the sea floor**; and fluxes of various **chemical substances** and **physical properties** within the ocean and across its boundaries. **Their research field includes the deep ocean and continental shelf regions**, as well as **the shore with its dunes and tidal rivers**.

Ophthalmologist

Ophthalmology is the branch of medicine that deals with the diagnosis and treatment of diseases and disorders of the eye. Ophthalmologists perform eye examinations to diagnose and treat various eye conditions, using advanced tools and technology. Ophthalmologists also perform surgical procedures such as cataract extraction and corneal transplants. They may prescribe corrective lenses and/or medication to improve a patient's vision.

Optometrist

Optometry is a healthcare profession concerned with the eyes and related structures, as well as vision, visual systems, and vision information processing in humans. Optometrists aim to give patients clear and efficient vision. They measure the efficiency of their patient's eyes and where necessary, take steps to improve or prevent deterioration of vision. They can prescribe spectacles or contact lenses to rectify or alleviate visual defects. Optometrists are skilled at detecting problems with vision, abnormal eye conditions and diseases of the eyes or related muscles, such as diabetic retinopathy. Clients with these kinds of difficulties are referred to an **ophthalmologist**. In addition, some optometrists may also own or manage a practice, and be involved in managing staff; supervising and training junior staff; managing the retail aspects of spectacles, contact lenses and other vision care products; and liaising with sales representatives from vision care product suppliers.

Paediatrician

Paediatricians are medical doctors who specialise in diagnosing and treating illnesses, injuries and promoting the physical, mental and psychological health of children from birth to adolescence. Typical daily activities of a paediatrician include meeting with children and parents and examining patients; sending off samples for diagnosis; making a prognosis, along with other health professionals; recommending a programme of action including surgery, drug administration or other forms of therapy; writing reports on patients; doing research; and keeping up to date with latest developments. Vital skills needed to succeed in this profession include empathy with children, a friendly personality and the ability to reassure parents.

Pharmacologist

Pharmacologists study the effect that drugs and other substances have on organs, tissues and the bodily function of humans and animals. Their experiments include establishing the effect drugs have on individual cells; determining how drugs are taken up by the body and how drug concentrations change in the body over a period of time; and testing the safety, activity and possible use of newly discovered or manufactured substances. Pharmacologists can specialise in drugs that are related to specific parts of the human body; for example, neuropharmacologists focus on drugs related to the nervous systems.

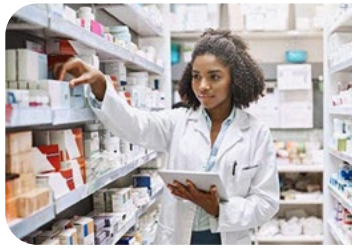
Paleontologist

Palaeontologists study the remains of ancient life forms. Many palaeontologists specialise in the study of fossils of all life forms, from dinosaurs, ancient mammals to tiny organisms from millions of years ago. Fossils are the remains or traces of ancient creatures preserved in rock and form part of the history of the earth. By studying the marking on stratified rocks and fossils, palaeontologists are able to establish, with remarkable accuracy, a record of the evolution of life through geological time.

Pathologist

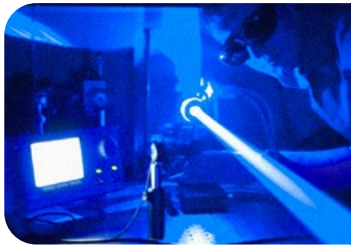
Pathology is the study of tissues, cells and bodily fluids to determine the causes and effects of disease or injury. The word pathology also refers to the study of disease in general, incorporating a wide range of bioscience research fields and medical practices. Pathologists are medical specialists who play a critical role in understanding the nature and progression of diseases. They address four components of disease: cause, mechanisms of development (pathogenesis), structural alterations of cells (morphologic changes), and the consequences of changes (clinical manifestations). Pathologists typically work in laboratories where they examine biopsy and bodily fluid samples and conduct tests to identify the underlying causes of illness or abnormalities. They also contribute to medical research, helping to advance our understanding of diseases and improving treatment strategies.

Pharmacist



Pharmacists are healthcare professionals who are involved in dispensing, manufacturing and preparing of medication. In a retail or clinic setting, pharmacists prepare medication according to a doctor's prescription, and check that the dosage and combination of medicines are safe to use. In a hospital environment, pharmacists need to monitor patients' responses to medications and ensure that the correct medications are being provided. Since pharmacists are often the most accessible medical professionals, they are becoming more involved in monitoring certain conditions (such as diabetes and high blood pressure) and helping with disease management. Some pharmacists work in the manufacturing industry, where they ensure that medicines are being made correctly and are safe to use. They may also be involved in creating new products and checking that these are safe and effective. Pharmacists form the link between pharmaceutical manufacturers and medical doctors, between doctors and patients, and between patients and their communities.

Photonics scientist and photonics engineer



Photonics scientists study photonics, which is the generation, transmission, modulation and detection of light. Photonics engineers develop the tools and technical applications of light Photonics engineers can investigate a variety of areas:

- design, test and modify laser equipment and components for manufacturing, defense, telecommunications and medicine,
- Improve the quality and design of fibre optics technology, and
- Devise methods for reducing the cost of manufacturing lasers, optical fibres and fibre-optics.

Physicist

Physics is a basic science. Physicists are scientists who study the theories that explain how the physical world behaves. In particular, they explore the properties of matter and energy. Physics is the study of the fundamental properties of matter, ranging from the microscopic world of subatomic and molecular particles, to the macroscopic world of cosmology and astrophysics. The two main types of physicists are **experimental physicists** and **theoretical physicists**. Experimental physicists work in laboratories or special research facilities to test the theories of physics, whereas theoretical physicists develop the theories to support practical work. These two types of physicists often work together to form and test new scientific theories. There are a variety of interest areas with-in physics, and many areas in which physicists may work, such as **environmental science, medical physics, teaching/lecturing, research**, and **cosmology** or **astrophysics** (studying the planets, stars and other substances and bodies in the universe).

Physiotherapist

Physiotherapists treat people for sicknesses, injuries and disabilities. They help people to recover from illness or injury, or to cope with disability and to lead independent and fulfilling lives. Physiotherapists

examine patients to evaluate how well the different body systems are working (such as respiratory, musculoskeletal, nervous and circulatory systems) and find out the causes of their pain. They treat patients using massage, exercise and equipment producing infrared radiation and ultrasound to restore or promote the normal physical functioning of the individual. They also use thermotherapy (heat treatment) and electrotherapy. Physiotherapists give advice on coping with chronic (ongoing) pain and illness.

Pilot

Aircraft pilots or **aviators** control the flight of an aircraft by operating its directional flight controls. Some other aircrew members, such as **navigators or flight engineers, are also considered aviators**, because they are involved in operating the aircraft's navigation and engine systems. Pilots must conduct pre-flight checks and inspections of the aircraft. They review weather conditions and flight plans to ensure a safe journey. During flight, the pilots take control of the aircraft and are responsible for navigation, take-offs, landings and all in-flight operations. They monitor instruments, communicate with air traffic controllers and in the case of an emergency they have to take control of procedures quickly and efficiently. After landing, pilots perform post-flight checks, complete paperwork and debrief with other crew members. A pilot's job requires a high level of skill, responsibility and professionalism.

Podiatrist

Podiatrists are health care professionals who use their knowledge of the anatomy and physiology of the human foot and leg to promote and maintain healthy feet. Podiatrists give practical health advice and may recommend or custom-make therapeutic biomechanical devices, such as in-shoe devices (orthotics) and inner soles to suit individual patients. Podiatrists treat conditions such as knock-knees, inwardly turned feet, skin infections (such as athlete's foot), as well as problems caused by conditions such as diabetes, arthritis, circulation problems, and sports injuries. They also treat foot and leg disorders in children, older people, or disabled people.

Psychiatrist

Psychiatrists are medical doctors who specialise in diagnosing, treating and preventing medical illness that can lead to psychological or mental problems. Treatment can include medication. Psychiatrists frequently work as part of a multi-disciplinary team composed of psychiatrists, psychologists, nurses, and other disciplines to provide holistic or comprehensive medical and counselling services to patients.

Psychologist

Psychologists study and assess human behaviour to help people become emotionally and socially healthier and better adjusted within themselves and their environment. Clinical psychology is the largest specialty area within psychology. This field is focused on the assessment, diagnosis, treatment and prevention of mental disorders. While many clinical psychologists perform psychotherapy with clients, it is important to note that it is not the only career path within clinical psychology. Other options include teaching at university level, conducting research and administering public programmes. A psychologist may work in the community or be involved in preventive work. They may teach people problem-solving skills or train community helpers. There are several categories of psychology, apart from **clinical psychology**, including **counselling** (advising people on how to deal with problems of everyday living), **educational psychology** (resolving the learning and behavioural problems of learners and students), and **industrial psychology** (applying psychological principles and research methods to the workplace to improve productivity and the quality of work-life).

Quantity surveyor

Quantity surveyors control the financial aspects of a building and construction project, and these professionals are often known as the accountants of the building industry. Quantity surveyors work as part of a multi-disciplinary team including architects, engineers and developers. As part of this team, they must make sure that projects are planned and completed according to a set budget, while still reaching a high standard of quality. Quantity surveyors often draw up construction contracts, settle payments and resolve disputes. They also need to consistently evaluate the progress of the project, and provide feedback. Quantity surveyors are often based in an office environment, but their work also involves being present on actual building sites, to ensure that things are being carried out correctly.

Radiation therapist

Radiation therapists provide radiation therapy to patients as prescribed by a **radiologist** or **oncologist** (cancer doctor) according to established practices and standards, usually in the treatment of particular types of cancer. They work closely with **medical physicists** and oncologists to develop an individualised treatment plan for each patient. They also have the responsibility to accurately position patients for treatment, according to prescription, and to enter data into the computer and set controls to operate and adjust equipment and regulate dosage. Radiation therapists conduct most treatment sessions independently, in accordance with the long-term treatment plan and under the general direction of the patient's doctor. They check radiation therapy equipment to ensure proper operation, observe and reassure patients during treatment and report unusual reactions to the doctor or turn equipment off if unexpected adverse reactions occur.

Radiographer

Radiographers use X-ray machines, ultrasound machines, computed tomography (CT) scanners and magnetic resonance imaging (MRI) machines to provide diagnostic images of the internal structures of the body. These images help qualified **medical doctors** and **dentists** diagnose and assess medical conditions. Radiographers are important members of the medical team. They are also responsible for the well-being of patients during their examination or treatment. Some specialised radiographers, known as radiation therapists, play a role in cancer treatment by administering radiation therapy, a common form of cancer treatment.

Researcher

All researchers share one primary objective: to uncover the meaning, significance, causes and effects of whatever subject they are investigating. The work they do can have academic, commercial, political, social or scientific impact. In scientific fields, researchers are often searching for solutions to problems that have eluded others for years.

Research psychologist

Psychology is a broad field with several areas of specialisation. Research psychologists apply skills in statistics, research design, computing and data analysis in an attempt to answer a variety of questions. They conduct research at centres, universities, corporations, non-profit organisations or for the government. They also look at the pattern of behaviour in humans or animals to learn about attention span, learning processes, effects of drugs, motivation, **genetics** and **neurology**.

Soil scientist

Soil scientists study the properties, composition and behaviour of soil. They focus on understanding the soil's physical, chemical and biological characteristics and how they influence plant growth, agriculture, land management and environmental sustainability. Soil scientists are trained to identify and evaluate soil types for agricultural and non-agricultural uses to determine

the deficiencies of various kinds of soil and how these may be rectified. Soil scientists work closely with **agricultural experts** and with **farmers**.

Sociologist

Sociology is a social science and the science of human relationships, how people and groups behave towards one another, as well as socio-economic development and changes. Sociologists study the origins, growth and interactions of human groups, for instance families, tribes, communities and social institutions such as religious, political and economic groupings. They trace the origins of these groups, study their growth, and analyse the influence of group activities on individual members. Sociologists can specialise in a wide range of areas, for example: **social groupings, social stratification and mobility, racial and ethnic relationships, social psychology** as well as **political, economic and applied sociology.**

Space weather analyst

Space weather analysts are atmospheric scientists who investigate atmospheric phenomena and interpret meteorological data gathered by surface and air stations. They study and forecast space weather, such as solar flares, geomagnetic storms and particle events. They use weather balloons, satellites and sensors to monitor weather and collect data. The data they collect and analyse are critical to understanding air pollution, drought, loss of the ozone layer and other problems. They warn the nation and clients via the media if a damaging solar storm is due or underway.

Statistician

Statistics are concerned with the collection, analysis, interpretation and presentation of quantitative information. They summarise and display the data on computers, turning it into information which is useful for scientific understanding and decision-making. An important aspect of a statistical analysis is that it recognises

the variability in the data and aims to understand the sources of this variation. Statisticians are found in a wide variety of organisations where they design and manage experiments and surveys. They process and analyse the data collected in context, and look for patterns to help make decisions.

Systems engineer

Systems engineers are mainly responsible for coordinating all the computer-related systems available in a company. They work closely with **database administrators** and develop and change databases to ensure an environment that is streamlined and automated.
System engineers design, develop and oversee all aspects of complex systems, often involving various components, technologies and processes. They have to see that all parts of a system work together seamlessly to achieve specific objectives. They use engineering principles and problem-solving skills to identify potential issues in a system and develop solutions.

Surgeon

Surgeons are **medical doctors** who specialise in performing surgical procedures to diagnose or treat various medical conditions and injuries. In the operating room, surgeons lead a team of **anesthesiologists, nurses** and **surgical assistants** to make sure that a procedure goes smoothly. After surgery they monitor the patient's recovery and provide postoperative care.
Surgeons may specialize in specific areas of medicine, such **cardiac surgery, neurosurgery**, or various other subspecialities.

Teacher

Teachers are responsible for the facilitation of learning and the development of skills in children. Teachers of STEM subjects facilitate the development of understanding of complex concepts. They must ensure that learners master certain concepts before they move on to the next grade. The specific nature of a teacher's work will

depend on the age of the children they reach and the nature of the training they received. Prospective teachers can be trained for foundation phase or pre-primary, primary or secondary education. Specialist education includes special needs schools such as those for children who suffer from epilepsy and for children with hearing, visual, mental or physical disabilities.

Telecommunication engineer

Telecommunications engineers plan, design, commission and maintain complex communication networks and associated equipment such as optic cables, microwave techniques, cellular radio and satellite communications. They develop the science and methods of telecommunications, the general and basic planning of future expansion and the design and planning of the automatic exchanges, carrier systems, telex systems, coaxial cable systems, microwave radio systems, optical fibre systems and videotext systems.

Transport analyst

Transport analysts are responsible for improving transportation safety and efficiency while reducing costs and minimising environmental impact. Transportation analysts also evaluate current projects, such as repaving highways, to determine their impact on social, environmental and economic factors. Analysts might devise more efficient systems and methods of transportation and use of GPS and traffic modelling programs to predict future transportation needs. They commonly work in project management positions.

Textile engineer

Textile engineers design and develop processes, equipment and procedures for the production of fibres, yarns and textiles.

Toxicologist

Toxicologists plan and carry out laboratory and field studies to identify, monitor and evaluate the impact of toxic materials and radiation on humans and the environment. Toxicologists' work typically includes isolating, identifying and quantifying toxic substances or radiation, and its effect on the people, animals, plants, or the whole ecosystem.

Urban and regional planner

Urban and regional planners develop, from regional to neighbourhood level, programmes for the best and most purposeful development of towns, cities and rural areas. They focus on improving the living conditions of people. They estimate future needs for housing, business and industrial sites, community facilities and open spaces to meet the needs of expansion and renewal.

Veterinarian

Veterinarians (vets) provide healthcare for a range of animals, including pets, livestock, zoo animals, wildlife, sporting and laboratory animals. Vets diagnose animals, provide prescriptions and give medication, vaccinate against disease, as well as treat and dress wounds. They also set fractures, perform surgery, autopsies and euthanasia, and assist at births. **Vets typically choose to work with either small animals (cats and dogs) or large animals (such as horses and cows**). They may specialise in a particular area, such as poultry. In a r**esearch role**, veterinarians test whether or not food from farm animals is suitable to be eaten, and may investigate new ways of treating and preventing disease. **They may also advise on the development of new products, and provide input on rural development.**

Virologist

Relevant to pandemics

Virologists study the viral microscopic organisms that cause diseases such as chickenpox, Ebola, HIV/Aids, hepatitis and influenza. Their work revolves around studying the structure, behaviour,

replication and transmission of these viruses, as well as their interactions with host organisms. They attempt to create new vaccines and medicine that will help cure these diseases and provide immunity to human beings. As experts in the study of viruses, virologists were at the forefront of efforts to understand and combat the novel coronavirus, SARS-CoV-2, which causes COVID-19.

Waste management engineer

Waste management engineers organise and manage waste disposal, collection and recycling facilities. They may also be responsible for waste treatment and street cleaning operations. Their tasks often include overseeing waste management schemes such as at landfill sites, and supervising the transport of waste so that land, air or water sources are not contaminated. Recycling functions, i.e., the manufacturing of recovered waste materials, often form part of their responsibilities.

Zoologist

Zoology is a basic science. It is the scientific study of animals (living organisms excluding plants, fungi, viruses and bacteria) and their relationship with their habitats (environments). Zoologists are biologists who study the origin, classification, characteristics, structure, growth and development of animals. Zoologists are sometimes known as **animal scientists** or **animal biologists**. Like botany and micro-biology, zoology is a major division of biology. As this field is so broad, **zoologists usually specialise in a particular type of animal or animal family, or in certain aspects of animal life such as genetics or animal classification.**

Relevant to pandemics

Bursary advice

Dear School Learner,

Pursuing STEM (science, technology, engineering, and mathematics) related courses can be a rewarding but often expensive endeavour. Fortunately, there are various bursary and scholarship opportunities available to support learners in their pursuit of STEM education. Here's some advice for learners seeking bursaries for STEM courses:

1. **Start early**: Begin your search for bursaries well in advance. Many organisations and institutions have application deadlines that can be months or even a year before the start of the academic year.
2. **Research thoroughly**: Explore all available options, including government bursaries, scholarships offered by universities, and those provided by private organisations and corporations. Look for both local and international opportunities.
3. **Meet eligibility requirements**: Ensure you meet the eligibility criteria for each bursary or scholarship you are interested in. Criteria may include academic performance, financial need, specific STEM field, and demographic factors.
4. **Maintain strong academics**: Many STEM bursaries have high academic requirements, so it is essential to maintain good grades throughout your academic journey.
5. **Prepare a strong application**: Craft a compelling application that highlights your achievements, goals, and passion for STEM. Tailor your application to the specific requirements of each scholarship.
6. **Seek guidance**: Consult with teachers, counsellors, and mentors for advice on finding and applying for STEM bursaries. They can offer valuable insights and help you refine your application.
7. **Financial aid office**: Contact the financial aid office at your chosen university or colleges. They can provide information about institutional bursaries and scholarships available to STEM students.
8. **Professional organisations**: Many professional STEM organisations offer bursaries to support students pursuing careers in their respective fields. See professional STEM societies on the NSTF website: See QR code to the left.
9. **Local community**: Investigate bursaries offered by local businesses, foundations, or community organisations. Sometimes smaller, local bursaries can be less competitive. See the NSTF website for a list of bursary providers:

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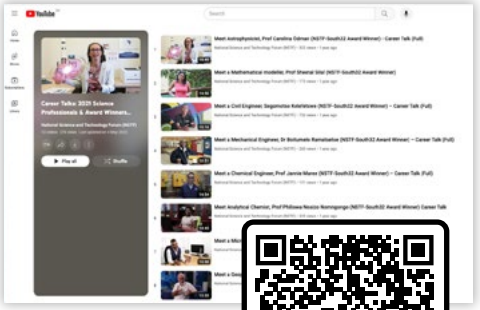
Bursary advice

10. **Apply for multiple bursaries**: Don't rely on just one source of funding. Apply for as many bursaries and scholarships as you qualify for to increase your chances of receiving financial support.
11. **Stay informed**: Keep an eye on deadlines and stay up to date with changes in eligibility criteria. Set up reminders to ensure you don't miss application deadlines.
12. **Thank you letters**: If you are awarded a bursary or scholarship, be sure to send a thank-you letter to the provider. This demonstrates your appreciation and may open doors to future opportunities.

Remember that competition for STEM bursaries can be fierce, so put your best effort into your applications. With dedication and perseverance, you can secure the financial support you need to pursue your STEM education and career goals.

NSTF has a Bursary Directory: www.nstf.org.za/bursaries which is kept up-to-date and current for available bursaries in South Africa. It focuses on bursaries for STEM courses. You'll find a list of currently available bursaries, as well as a list of South African organisations that normally provide bursaries.



2021 winners playlist on YouTube

2022 playlist on YouTube

You can also watch inspiring stories and career talks by scientists on the NSTF YouTube channel: National Science and Technology Forum (NSTF).

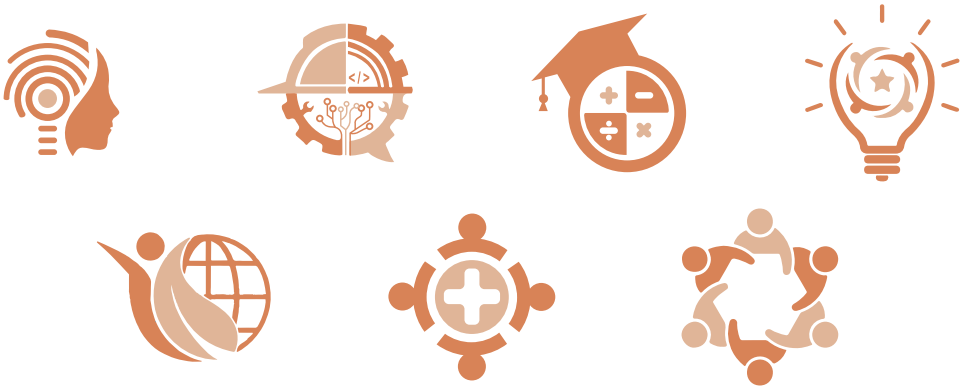
To access STEM-related bursaries, simply scan the QR Code provided (left). Our data is continually refreshed to ensure the latest information is available to you.

Notes

National Science and Technology Forum

STEMulator.org

the hidden world revealed



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