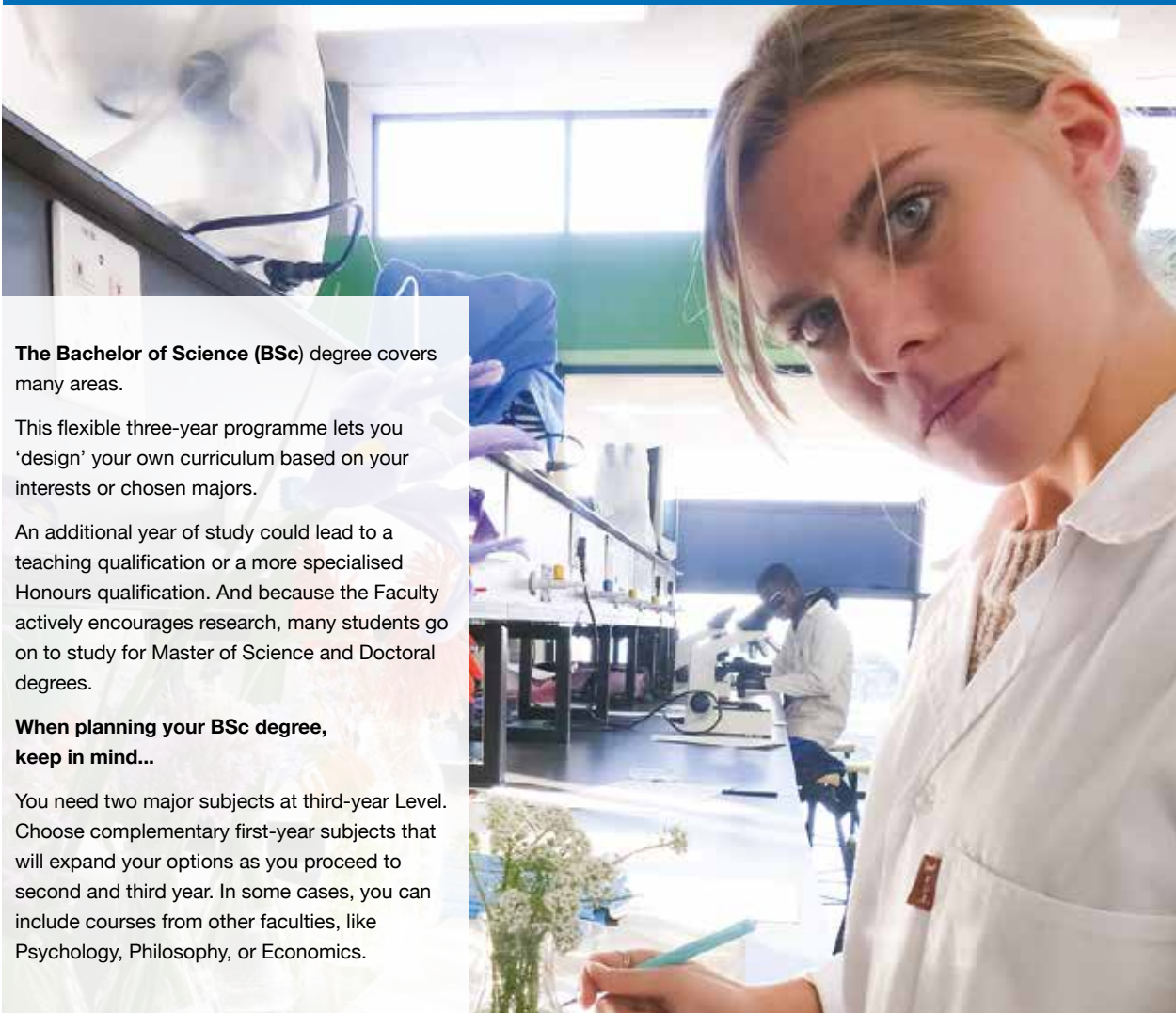


Science



The Bachelor of Science (BSc) degree covers many areas.

This flexible three-year programme lets you ‘design’ your own curriculum based on your interests or chosen majors.

An additional year of study could lead to a teaching qualification or a more specialised Honours qualification. And because the Faculty actively encourages research, many students go on to study for Master of Science and Doctoral degrees.

When planning your BSc degree, keep in mind...

You need two major subjects at third-year Level. Choose complementary first-year subjects that will expand your options as you proceed to second and third year. In some cases, you can include courses from other faculties, like Psychology, Philosophy, or Economics.

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Studying science opens doors to exciting careers in fields like medical research, chemistry, computer science, biotechnology, genetic engineering, and environmental sciences.

restoration; ecophysiology; systematics; taxonomy; and evolutionary biology.

The courses teach important basic knowledge, while exploring new and relevant fields. Training involves both field work and laboratory skills. The majors combine courses to offer you flexibility and choice.

The School of Molecular and Cell Biology offers four majors: Applied Bioinformatics, Biochemistry and Cell Biology, Genetics and

Developmental Biology, and Microbiology and Biotechnology.

This programme gives you a comprehensive introduction to molecular advances and their application in medicine, agriculture, and biotechnology. Considered the science of the future, molecular understanding has made a substantial impact in a number of disciplines, including bioinformatics, forensics, and drug design.

Regardless of the stream you choose, you must register for Introductory Life Sciences, Chemistry, and Auxiliary Mathematics in your first year. Other course options include Complementary Life Sciences, Physics Auxiliary, Psychology, Geography, Archaeology, and Philosophy.

Earth Sciences

Earth Sciences study the earth's processes, atmosphere, and organisms. Specialist fields include the exploration for, and mining of, minerals; weather and earthquake prediction; the evolution of species; and the state of our natural environment and how to best manage it.

Earth Sciences courses are taught through the Schools of Geosciences and Geography, Archaeology, and Environmental Studies.

Mathematical Sciences

Wits has three 'Mathematical Sciences' schools, including the School of Mathematics, the School of Computer

Science and Applied Mathematics, and the School of Statistics and Actuarial Science.

Know the difference

- Pure Mathematics is a developing science.
- Computer Science covers hardware and software, in all their applications.
- Applied Mathematics has applications in banking, finance, and industry.
- Statistics and Actuarial Science are important in business and governmental planning, insurance, finance, banking, and investments.

Physical Sciences

Physical Sciences include nuclear, particle, solid and liquid state physics, as well as electricity, electronics, magnetism, optics, acoustics, heat, and thermodynamics. This area also covers the composition of matter (gas, liquid or solid) and the changes that take place under certain conditions. Physical Sciences are taught by the Schools of Chemistry and Physics.

Broad Areas of Study in Science

The broad areas of study covered in the BSc degree include:

Biological Sciences

Biology involves the study of living organisms, from understanding genes to managing ecosystems. This includes the biochemistry of molecules, such as DNA, RNA, and proteins; the physiological functions of cells, tissues, organs, and organ systems; the influence of evolutionary relationships on biological problems; and aquatic and terrestrial ecology.

Biological Sciences fall into two main streams: the **School of Animal, Plant and Environmental Sciences**, and the **School of Molecular and Cell Biology**.

Courses offered by the School of Animal, Plant and Environmental Sciences cover three broad themes: Biodiversity, Ecology and Conservation, and Organismal Biology.

You will study living things and their interaction with the environment. Specialist areas include savannas, grasslands, and aquatic biology, focusing on biodiversity, sustainable resources, and range limitation; ecology and animal behaviour (herbivores, beetles, rodents, lizards, snakes, birds, etc.); biocontrol; biodiversity; conservation;

The BSc programme is based on a credit system. Each course carries a number of credits, defined by Level and duration. You need to complete a minimum number of science courses to have two major courses at third-year Level, one of which must be in the Faculty of Science.

The BSc points credit structure:

Four Level I courses

- three of these must be major courses
- minimum of 144 credits

Three Level II courses

- two of these must be major courses
- minimum of 144 credits

Two Level III courses

- at least one of which must be taken through the Faculty of Science
- minimum of 144 credits

Biodiversity

Bachelor of Science in the field of Biological Sciences

SBA11

Major: Biodiversity

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 5

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Agricultural Research Council (ARC)
- Biodiversity Planner
- Biology Education
- Department of Water Affairs and Forestry (DWA)
- Education Officer
- Herbaria (e.g. at Kirstenbosch)
- Medical Research (Linked to Herbal Medicines)
- Nature Conversation
- Research for the Council for Scientific And Industrial Research (CSIR)
- Scientific Journalism
- Private Consulting Firms
- South African National Biodiversity Institute (SANBI)



Programme Description

Study the foundations of animal, ecology, and plant sciences.

This exciting course, offered by the School of Animal, Plant and Environmental Sciences, provides you with the appropriate skills, knowledge, and attitudes needed for a range of zoological, botanical, and ecological careers and specialisations.

Curriculum

First year

Introductory Life Sciences I

AND

Chemistry I

AND

Auxiliary Mathematics I

AND

Any other Level I course

Recommended:

Complementary Life I Sciences I

Second year

Aquatic Ecology II

Biotic Diversity II

Evolution II

Fundamentals of Ecology II

Introduction to Animal Behaviour II

AND

Basic Statistics for the Natural Sciences II

AND

Any other Level II courses

Third year

Each major has a choice of the following courses:

Animal Behaviour III

Behavioural Ecology III

Biogeography III

Biosystematics and

Evolution III

Diversity, Ecology and Economic Importance of Algae III

Medical and Applied Entomology III

Molecular Ecology III

Palaeontology III

Physiological Entomology III

Plant Propagation and Conservation III

Sustainability and Environmental Sciences III

AND

one field trip course:

• Applied Freshwater Ecology and Management III

• Experimental Field Biology III

OR

one laboratory course:

• Microscopy III

• Service Learning in Biology III

Course selection is subject to the guidance of the School for second and third year majors.

Ecology and Conservation



Bachelor of Science in the field of Biological Sciences

SBA11

Majors:

Ecology and Conservation

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR
First Additional Language

Level 5

Mathematics

Level 5

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on
page 35

Closing Date: 30 September

Careers

- Ecotourism
- Environmental Consultancy
- Environmental Economist
- Environmental Education
- Environmental Engineer
- Environmental Lawyer
- Environmental Management
- Environmental NGO
- Forestry
- Nature Conservation
- Planning and Consulting
- Wildlife Documentaries
- Research for South African Environmental Observation Network (SAEON)

Programme Description

Study ecology, conservation, and environmental science.

You will gain insight into the quantitative study and use of ecological, physiological, and systematic principles. These are studied in the contexts of ecology, conservation, and environmental science, and their applications in conservation biology and environmental management.

You can continue studies in Law, Economics, Engineering, Veterinary Science, and Development Management.

Offered by the School of Animal, Plant and Environmental Sciences, this career line includes diverse training in ecology and conservation, which are sought-after skills in dealing with the interdisciplinary challenges faced by society.

Curriculum

First year

Introductory Life Sciences I

AND

Chemistry I

AND

Auxiliary Mathematics I

AND

Complementary Life Sciences I

OR

Any other Level I course

Second year

Aquatic Ecology II

Evolution II

Fundamentals of Ecology II

Introduction to Animal Behaviour II

AND

Basic Statistics for the Natural Sciences II

AND

Any other Level II courses

Third year

Each major has a choice of the following courses:

- Applied Population Ecology III
- Ecological Communities and Biodiversity Conservation III
- Functional Ecology in Changing Environments III
- Molecular Ecology III
- Plant propagation and Conservation III
- Spatial Ecology and Conservation III
- Sustainability and Environmental Sciences

AND

one field trip course:

- Applied Freshwater Ecology and Management III
- Field Methods in Terrestrial Ecology III
- People and Conservation Field Course III

OR

one laboratory course:

- Service Learning in Biology III
- Microscopy III

Course selection is subject to the guidance of the School for second and third year majors. ■

Organismal Biology

Organismal Biology



Bachelor of Science in the field of Biological Sciences

SBA11

Major: Organismal Biology

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 5

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Biodiversity Planner
- Biology Education
- Education Officer
- Private Consulting Firms
- Scientific Journalism
- Veterinary Research Institute
- Research or related work in various institutions:
 - Council for Scientific and Industrial Research (CSIR)
 - Agricultural Research Council (ARC)
 - Department of Water Affairs and Forestry (DWA)
 - South African National Biodiversity Institute (SANBI)
 - Nature conservation, museums (e.g. Ditsong NMNH)

Programme Description

Study how evolution, heredity, and development shape animal and plant life.

Animal and plant life is shaped by central processes of evolution, heredity, and development. In the School of Animal, Plant and Environmental Sciences, we focus largely on whole organisms. But we also cover topics ranging from basic animal or plant biology, including physiology, to animal and plant interactions with the biotic and abiotic characteristics of their environments.

The syllabus provides broad competence for careers involving the biology of animals and plants in relation to their environment, including human or veterinary medicine.

This major aligns well with Physiology or Anatomy offered through the Faculty of Health Sciences (refer to pages 87 for more information) and is an excellent first degree for continuing in the medical profession.

Curriculum

First year

Introductory Life Sciences I

AND

Chemistry I

AND

Auxiliary Mathematics I

AND

Any other Level I course

Second year

Animal Form and Function II

Introduction to Animal Behaviour II

Evolution II

Reproductive Biology II

Whole Plant Physiology II

AND

Basic Statistics for the Natural Sciences II

AND

Any other Level II courses

Third year

Each major has a choice of the following courses:

- Animal Behaviour III
- Behavioural Ecology III
- Biogeography III
- Biosystematics and Evolution III
- Medical and Applied Entomology III
- Molecular Ecology III
- Palaeontology III
- Physiological Entomology III
- Plant Propagation and Conservation III

AND

one field trip course:

- Applied Freshwater Ecology and Management III
- Experimental Field Biology III

OR

one laboratory course:

- Microscopy III
- Service Learning in Biology III

Applied Bioinformatics

Bachelor of Science in the field of Biological Sciences

SBA11

Major: Applied Bioinformatics

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 5

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Biomechanics
- Biostatistics
- Conservation Genomics
- Data Management
- Drug Discovery
- Genomics
- Healthcare Scientist
- Molecular Modelling
- Pharmacogenomics
- Precision Medicine

Programme Description

Study how bioinformatics is used to select and describe computational results.

This programme, offered by the School of Molecular and Cell Biology, helps you to understand how bioinformatics is used in the scientific field. This includes how to select, describe,



and use basic bioinformatics tools and how to interpret computational results.

You will learn the history and application of bioinformatics, as well as algorithm, pipeline and software development and analysis, and the transfer and storage/database development of genomics data. You will also explore gene expression data analysis, protein structure, functional genomics, and genome analysis. Bioinformatics is important to genetic research because the large-scale, complex data that is generated in genomics simply wouldn't make sense without contextual knowledge of how life forms work.

Curriculum

First year

Introductory Life Sciences I

AND

Chemistry I

AND

Auxiliary Mathematics I

OR

Mathematics I (Major):

- Algebra I
- Calculus I

AND

Any other Level I course

Recommended course:

Physics I (Auxiliary)

Second year

Molecular and Cell Biology IIA: Scientific Practice

AND

Molecular and Cell Biology IIB: Concepts

AND

Basic Statistics for the Natural Sciences II

AND/OR

Molecular and Cell Biology IIC: Applications for double-MCB major students

AND/OR

Any other Level II major depending on other course set

Third year

Applied Bioinformatics III

AND

Any other Level III major depending on other course set

Third year

Applied Bioinformatics III

AND

Any other Level III major depending on other course set

Biochemistry and Cell Biology



Bachelor of Science in the field of Biological Sciences

SBA11

Majors:

Biochemistry and Cell Biology

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 5

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Analytical Biochemistry
- Biomedical Scientist
- Clinical Biochemistry
- Forensic Scientist
- Healthcare Scientist
- Industrial Enzymology
- Life Science Research Scientist
- Nanotechnologist
- Personalised Medicines
- Protein Biotechnology

Programme Description

Study life forms and their functions at the molecular level.

Biochemistry embraces the fascinating worlds of Molecular Biology, Biotechnology, Genetic Engineering, Immuno-Technology, Advanced Cell Biology, and Enzymology.

In Biochemistry and Cell Biology, you will study all living organisms (microbes, parasites, plants, insects, animals, and humans) at the molecular level. You will investigate the structure and biological functions of enzymes, carbohydrates, fats, proteins, and nucleic acids.

Curriculum

First year

Introductory Life Sciences I

AND

Chemistry I

AND

Auxiliary Mathematics I

AND

Any other Level I course

Second year

Molecular and Cell Biology IIA: Scientific Practice

AND

Molecular and Cell Biology IIB: Concepts

AND

Basic Statistics for the Natural Sciences II

AND/OR

Molecular and Cell Biology IIC: Applications for double-MCB major students

AND/OR

Any other Level II major depending on other course set

Third year

Biochemistry and Cell Biology III

AND

Any other Level III major depending on other course set

Genetics and Developmental Biology

Bachelor of Science in the field of Biological Sciences

SBA11

Majors: Genetics and Developmental Biology

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 5

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Clinical Research Associate
- Genetic Counselling
- Healthcare Scientist (Immunology)
- Medical Diagnostics
- Pharmacogenetics
- Plant and Animal Breeding
- Research Scientist (Life Sciences and Medical)
- Scientific and Medical Research

Programme Description

Study how genes function.

This is the era of the gene. You can sequence it. You can research how it functions. You can study how it makes an animal, plant, bacterium, or virus. You can understand how

it evolves and how it can make cells cancerous. What's more, with the help of modern tools, you can now quickly and precisely edit a plant or animal genome.

See how genes are transforming biology, biotechnology, the pharmaceutical industry, and medicine.

Due to recent discoveries in genetics, the biotech field is about to undergo an explosion similar to that of the IT field in the 1980s, and you can be part of this by joining MCB Genetics. Our courses include: Gene Regulation in Eukaryotes, Molecular Genetics of Prokaryotes, Chromosomes and Gene Maps, and Advanced Animal Developmental Biology.

Curriculum

First year

Introductory Life Sciences I

AND

Chemistry I

AND

Auxiliary Mathematics I

AND

Any other Level I course

Second year

Molecular and Cell Biology IIA: Scientific Practice

AND

Molecular and Cell Biology IIB: Concepts

AND

Basic Statistics for the Natural Sciences II

AND/OR

Molecular and Cell Biology IIC: Applications for double-MCB major students

AND/OR

Any other Level II major depending on other course set

Third year

Genetics and Developmental Biology III

AND

Any other Level III major depending on other course set

Microbiology and Biological Sciences



- Insecticides Research and Production
- Healthcare Scientist (Immunology)
- Microbiology
- Nanotechnology
- Pharmacology
- Production of Scientific Products
- Water Quality Research

Programme Description

Study microbe groups, their morphology, metabolism, genetics, and taxonomy.

Microbiology and Biotechnology is the study of small living creatures, or microbes, including bacteria, viruses, yeasts, and fungi. Our courses provide you with basic knowledge of the various microbe groups, their morphology, metabolism, genetics, and taxonomy. Microbiology and Biotechnology embrace environmental biotechnology, industrial microbiology, food and medical microbiology, and plant genetic engineering.

Curriculum

First year

Introductory Life Sciences I

AND

Chemistry I

AND

Auxiliary Mathematics I

AND

Any other Level I course depending on other course set

Second year

Molecular and Cell Biology IIA: Scientific Practice

AND

Molecular and Cell Biology IIB: Concepts

AND

Basic Statistics for the Natural Sciences II

AND/OR

Molecular and Cell Biology IIC: Applications for double-MCB major students

AND/OR

Any other Level II major depending on other course set

Third year

Microbiology and Biotechnology III

AND

Any other Level III major depending on other course set

Bachelor of Science in the field of Biological Sciences

SBA11

Majors: Microbiology and Biotechnology

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 5

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Agricultural, Medical, Environmental and Veterinary Biotechnology
- Brewing
- Industrial Biotechnology
- Food Security

Geographical and Archaeological Studies

Bachelor of Science in the field of Geographical and Archaeological Studies

SBA10

Majors: Geography and Archaeology

Duration 3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 5

Wait-listing

Applicants with 38–39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Biodiversity Conservation
- Climate Change
- Environmental Assessment
- Ecosystem Services
- Food Security
- Geomorphology
- Hydrology
- Market Research
- Meteorology and Weather Forecasting
- Property Development
- Urban Development
- Rural Development
- Tourism Development
- Water or Aquatic Resources Management
- Contract Archaeology
- Conservation
- Environmental and Cultural Heritage

- Management
- Heritage Assessors
- Museum Curator
- Museum Development
- Research
- Site Development
- Tourism and Media

Programme Description

Study the origins of humans and the evolution of the technology we use.

South Africa's archaeological record is particularly rich. It covers a period of over two million years, starting with the first toolmakers. Archaeology is a dynamic subject that grows with each new discovery or technological advance. As a prospective archaeologist, you will learn about the origins of humans, rock art, and the evolution of technology from the Stone Age to the present. Field work takes you to some of South Africa's best archaeological sites.

Curriculum

First year

Geography I

AND

Archaeology I

AND

Auxiliary Mathematics I

OR

Mathematics I (Major)

- Algebra I

- Calculus I

Any other Level I course

Recommended courses:

Chemistry I

Geology I

Second year

Geography II

Earth and Atmospheric Processes II

OR

- An introduction to climate change and Society II

- Environmental Governance: From local to Global II

OR

- Conservation Biogeography II

- Geographic Information Systems

- Science and Mapping Systems II

- Thinking Geographically: Concepts and Practices in Human Geography II

AND

Archaeology II

AND

Any other Level II major depending on other course set

Third year

Geography III

Four courses from:

- Food: Security, Politics and Culture III

- Climate and Environmental Change III

- Economic Geography III

- Environmental Monitoring and Modelling III

- Geographic Information Systems and Remote Sensing III

- Theory and Practice in Sustainability Science and Sustainable Development III

- Urban Features: The Political-Economy of Population and Scarcity III

- Coastal Geomorphology III

- Advanced Atmospheric Sciences III

AND/OR

Archaeology III

AND/OR

Any other Level III major depending on other course set

NB: All eight Geography III courses may be taken for a double major in Geography

Geological Sciences

Bachelor of Science in the field of Geological Sciences

SBA09

Majors: Geology and Applied Geology

Duration 3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 6

Physical Science

Level 5

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Academic Researcher
- Environmental Consultant
- Geochemist
- Geologist
- Geophysics Consultant
- Gis-Remote Sensing Specialist
- Government Survey Geologist
- Heritage/Tourism Consultant
- Hydrogeologist
- Mining
- Mining Analyst
- Minerals and Oil Exploration Geologist
- Mineralogist
- Palaeontologist
- Teacher

Programme Description

Study mineral exploration and extraction.

Geoscientists are key to South Africa and Africa's current and future economic development and carry out important work in searching for, and extracting, economic mineral resources. Most graduates work in mines or for mineral exploration companies. An increasing number of graduates work in environmental geoscience. As a geoscientist, you must be inquisitive and passionate about the world, be prepared to travel, and enjoy working outdoors or in a mining environment. South Africa's large mining sector provides bursary opportunities.

If you have good Mathematics and Physical Sciences marks, and take Geology II and III, you can specialise in Mining Geology through second- and third-year co-majors. The School also offers a selection of specialist courses in Advanced Earth Sciences and Applied Geology co-majors.

Curriculum

First year

Geology I

AND

Chemistry I

AND

Mathematics I (Major):

• Algebra I

• Calculus I

OR

Auxiliary Mathematics I (at the discretion of the Head of School)

AND

Any other Level I course

Recommended courses:

- Geography I
- Physics I (Major)
- Introductory Life Sciences I

Second year

Geology II

- Igneous Petrology and Processes II
- Mineralogy and Optical Mineralogy II
- Metamorphic Petrology and Processes II
- Sedimentology, Stratigraphy, and Palaeontology II

AND

Applied Geology II

- Introduction to Geochemical Techniques II
- Geological Mapping Techniques II

AND

Basic Statistics for Natural Scientists II

AND

Any other Level II major depending on other course sets

Third year

Geology III

- Advanced Petrology III
- Economic Geology and Ore Petrology III
- Structural Geology III
- Tectonics of the Earth III

AND

Applied Geology III

- Advanced Geological Mapping Techniques III
- Exploration Methods III
- Geographical Information Systems and Remote Sensing III
- Hydrogeology and Water Resource Management III

Actuarial Science

Bachelor of Science in the field of Actuarial Science

SBA03

Majors: Actuarial Science and Mathematical Statistics

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 7

Mathematics

Level 7

Physical Science

Level 7

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Asset Management
- Banking
- Consulting
- Enterprise Risk Management
- General Insurance
- General Management
- Health Care
- Life Insurance
- Research and Planning
- Retirement Funding

Programme Description

Study the application of analytical, statistical, and mathematical skills to financial and business problems.

A Wits Actuarial Science degree gives you a solid foundation for the internationally recognised actuarial examination. Over 480 graduates have qualified as

actuaries since the programme began in 1983.

An actuary is a professional who applies analytical, statistical, and mathematical skills to financial and business problems. This is especially valuable when facing problems involving uncertain future events or financial risks in insurance, retirement, investments, and risk management environments.

The School of Statistics and Actuarial Sciences offers the largest number of accredited subjects of any single university in Africa.

Curriculum

First year

Actuarial Science I

AND

Mathematical Statistics I

AND

Mathematics I (Major):

- Algebra I
- Calculus I

AND

Economic Theory IA Microeconomics

Economic Theory IB Macroeconomics

AND

Business Accounting I

Second year

Actuarial Science II

AND

Mathematical Statistics II

AND

Mathematics II:

- Abstract Mathematics II
- Differential Equations II
- Basic Analysis II
- Linear Algebra II
- Multivariable Calculus II
- Transition to Abstract Mathematics II

Third year

Actuarial Science III

AND

Mathematical Statistics III

Computational and Applied Mathematics

Bachelor of Science in the field of Computational and Applied Mathematics

SBA13

Major: Computational and Applied Mathematics

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 6

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

Requires postgraduate studies that lead to mathematical modelling which is applicable in medicine, economics and in the social sciences, advanced mathematics of finance and can also lead to careers in astronomy and trading.

Programme Description

Study mathematical invention to find practical solutions to real-life problems.

Applied Mathematics is important in many disciplines, The School also teaches engineers, architects, building scientists, town planners, commerce students, and medical and health science students.

Curriculum

First year

Computational and Applied Mathematics I

AND

Mathematics I (Major):

- Algebra I
- Calculus I

AND

Any two other Level I courses

Recommended courses:

Computer Science I:

- Discrete Computational Structures I
- Introduction to Algorithms and Programming I

- Introduction to Data Structures and Algorithms I

- Basic Computer Organisation I

Physics I (Major)

Second year

Computational and Applied Mathematics II

AND

Mathematics II :

- Abstract Mathematics II
- Basic Analysis II
- Introduction to Mathematical Statistics II
- Linear Algebra II
- Multivariable Calculus II
- Transition to Abstract Mathematics II

AND

Any other Level II major depending on other course sets

Third year

Computational and Applied Mathematics III

AND

Any other Level III major depending on other course sets

Computer Science

Bachelor of Science in the field of Computer Science

SBA13

Majors: Computer Science and Computational Applications

Duration

3 years

NSC Requirements

APS 40+

English Home Language OR First Additional Language

Level 5

Mathematics Level 6

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Advertising
- Game Design
- Software Development
- Software And System Architects
- Teaching
- Research
- Robotics

Programme Description

Study the many ways in which computers can be used in problem-solving.

Computer Science is the discipline of solving problems via solutions

that are implemented on computers. These problems can arise from a variety of areas, such as commerce, finance, mining, science, engineering, mathematics, music, and entertainment.

To be a successful Computer Science student, you will need to be creative and have good critical thinking skills, analytical ability, and mathematical ability.

The undergraduate Computer Science curriculum teaches you the fundamental mathematical and scientific principles behind Computer Science, as well as the practical skills required. You will be taught how to design and implement programs, and how to analyse them for correctness and efficiency. You will also take courses in computer networks, database systems, operating systems, artificial intelligence, formal languages, software design, and data structures.

Curriculum

First year

Computer Science I:

- Basic Computer Organisation I
- Discrete Computational Structures I
- Introduction to Algorithms and Programming I
- Introduction to Data Structures and Algorithms I

AND

Mathematics I (Major):

- Algebra I
- Calculus I

AND

Computational and Applied Mathematics I

AND

Any other Level I course

Second year

Computer Science II:

- Analysis of Algorithms II
- Computer Networks II
- Database Fundamentals II
- Mobile Computing II

AND

Mathematics II:

- Abstract Mathematics II
- Basic Analysis II
- Introduction to Mathematical Statistics II
- Linear Algebra II
- Multivariable Calculus II
- Transition to Abstract Mathematics II

AND

Computational and Applied Mathematics II

Third year

Computer Science III:

- Analysis of Advanced Algorithms III
- Formal Languages and Automata III
- Software Design III or Software Engineering III
- Operating Systems and System Programming III

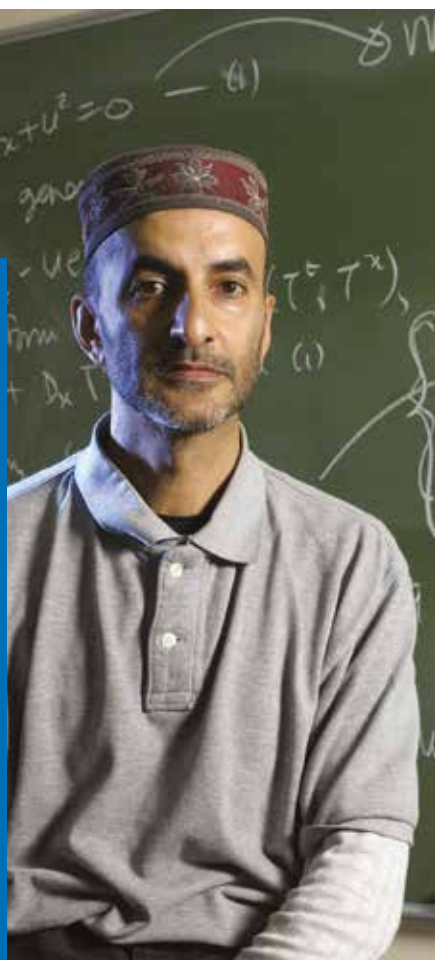
AND

Computational Applications III:

- Computer Graphics and Visualisation III
- Machine Learning III
- Parallel Computing III
- Software Design Project III

Mathematics

Mathematics



Bachelor of Science in the field of Mathematics

SBA13

Major: Mathematics

Duration

3 years

NSC Requirements

APS 40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 6

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

Most of our graduates work in the financial sector, in mathematical finance and in the building of mathematical/statistical models of market and consumer behaviour.

Programme Description

Study the quantitative and logic structure that underpins many important fields of study.

Mathematics is the quantitative and logic structure that forms the basis of all analytical science, modern economics, and finance.

You will take major stream Mathematics courses if you require Mathematics as a tool in other disciplines, or you intend to specialise in Mathematical Sciences or associated subjects, such as Mathematical Physics and Theoretical Physics.

Curriculum

First year

Mathematics I:

- Algebra I
- Calculus I

AND

Any three other Level I courses

Recommended courses:

Computer Science I:

- Basic Computer Organisation I
- Discrete Computational Structures I
- Introduction to Algorithms and Programming I

- Introduction to Data Structures and Algorithms I
- Computational and Applied Mathematics I
- Economics IA Microeconomics
- Economics IB Macroeconomics
- Physics I (Major)

Second year

Mathematics II :

- Abstract Mathematics II
- Basic Analysis II
- Linear Algebra II
- Multivariable Calculus II
- Differential Equations II

OR

- Introduction to Mathematical Statistics II
- Transition to Abstract Mathematics II

AND

Any two other Level II majors depending on other course set

Third year

Mathematics III:

- Number Theory III

OR

- Topology III
- Group Theory III
- Intermediate Analysis III
- Real Analysis III

OR

- Leontief Systems III
- Coding and Cryptography III

OR

- Differential Geometry III
- Complex Analysis III

Mathematics of Finance

Bachelor of Science in the field of Mathematics of Finance

SBA16

Majors: Investment and Corporate Finance OR Economics, Computational and Applied Mathematics OR Computer Science OR Mathematics

Duration 3 years

NSC Requirements

APS 42+

English Home Language OR First Additional Language Level 5

Mathematics Level 6

Wait-listing

Applicants with 40-41 points may be wait-listed subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

Depending on courses taken:

- Economist • Financial Mathematician
- Financial Systems Developer
- Investment Strategist
- Quantitative Analyst
- Quantitative Trader
- Risk and Investment Consultant

Programme Description

Study financial environments.

This programme consists of one major in a computational or mathematical field, like Applied Mathematics, Mathematics or Computer Science, and one major in a financial or economic field, like Economics or Corporate Finance and Investments. Students also complete a single year in Business Accounting. You can take postgraduate studies in any related field, which broadens your

career options. As a graduate of this programme, you will be financially, mathematically, and computationally literate. You will typically work as a quantitative analyst, risk or portfolio manager, financial engineer, or back-end programmer in environments requiring computational skills and an understanding of financial environments. These include banks, investment houses, and other corporate entities.

Curriculum

First year

Economic Theory IA Microeconomics

Economic Theory IB Macroeconomics

AND

Computer Science I:

- Basic Computer Organisation I
- Discrete Computational Structures I
- Introduction to Algorithms and Programming I
- Introduction to Data Structures and Algorithms I

AND

Computational and Applied Mathematics I

AND

Mathematics I (Major):

- Algebra I
- Calculus I

Second year

Mathematics II :

- Abstract Mathematics II
- Basic Analysis II
- Linear Algebra II
- Multivariable Calculus II
- Transition to Abstract Mathematics II
- Introduction to Mathematical Statistics II

AND

Economics IIA and IIB

OR

Investments II

Corporate Finance II

AND

Computer Science II:

- Analysis of Algorithms II
- Computer Networks II
- Database Fundamentals II
- Operating Systems II

OR

Computational and Applied Mathematics II

Third year

Economics III

OR

Business of Finance III

AND

Computational and Applied Mathematics III

OR

Computer Science III:

- Analysis of Advanced Algorithms III
- Formal Languages and Automata III
- Machine Learning III
- Software Design III

OR

Software Engineering III

OR

Mathematics III:

- Number Theory III

OR

Topology III

Group Theory III

Intermediate Analysis III

Real Analysis III

OR

Leontief Systems III

Coding and Cryptography III

OR

Differential Geometry III

Complex analysis II ■

Mathematical Sciences

Bachelor of Science in the field of Mathematical Sciences

SBA08

Majors: Mathematics and Statistics

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 7

Mathematics

Level 7

Physical Science

Level 7

Wait-listing

Applicants with 38-39 points may be wait-listed subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Advanced Mathematics of Finance
- Banking
- Statistician

Programme Description

Study statistics and computations, and develop problem-solving skills.

The Mathematical Sciences curriculum will develop your problem-solving skills, combining statistical and computational aspects. These high-Level skills can be applied in high-performance computing, robotics, operations research, and many other areas.

Theoretical and practical skills are necessary in Mathematical Sciences when pushing the boundaries of technological development.

Curriculum

First year

Mathematics I (Major):

- Algebra I
- Calculus I

AND

Computational and Applied Mathematics I

AND

Mathematical Statistics I

AND

Additional courses yielding a minimum of 54 Level I credits

Second year

Mathematics II:

- Basic Analysis II
- Abstract Mathematics II
- Differential Equations II
- Multivariable Calculus II
- Linear Algebra II
- Transition to Abstract Mathematics II

AND

Computational and Applied Mathematics II

AND

Mathematical Statistics II

Third year

Mathematical Statistics III

AND

Computational and Applied Mathematics III

OR

Mathematics III:

Number Theory III

OR

Topology III

Group Theory III

Intermediate Analysis

Real Analysis III

OR

Leontief Systems III

OR

Coding and Cryptography III

OR

Complex Analysis III ■

Chemistry

Bachelor of Science in the field of Physical Sciences (Chemistry)

SBA12

Majors:

Chemistry and Applied Chemistry

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR

First Additional Language

Level 5

Mathematics

Level 6

Physical Science

Level 5

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on

page 35

Closing Date: 30 September

Careers

- Administrators
- Agricultural Research
- Applied Chemical Research
- Biotechnology
- Chemical Analysis
- Chemical Services
- Consultants
- Environmental Research
- Food and Drink Technology
- Forensic Science
- Forestry Research

- Hazardous Waste Management
- Materials Research
- Medical Research
- Patents
- Pesticides Industry
- Petrochemical Industry
- Personal Care Chemistry
- Sales of Scientific Equipment
- Science Publishing
- Science Teacher
- Textile Chemistry
- Water Treatment and Analysis
- Quality Control and Management

Programme Description

Study the structure, composition, behaviour, and energetics of substances.

Chemistry is known as the central science because it lies between Physics and Mathematics on the one hand, and Biological and Earth Sciences on the other. It is concerned with matter and how it changes. As a chemist, you will study the structure, composition, behaviour, and energetics of substances. You will explore what happens when atoms and molecules react, and try to understand the underlying changes that occur. You will observe phenomena in the world around us, and your discoveries could impact our everyday lives.

Chemistry trains you to think logically, analytically, and creatively. Basic Chemistry skills have applications in patent law, commerce, management and teaching, drawing on the language of Mathematics and the laws of Physics to describe the world from a chemical, biological, and

physical point of view. Chemistry plays a vital part in our understanding of the structure and interactions of matter in the universe.

Curriculum

First year

Chemistry I

AND

Mathematics I (Major):

- Algebra I
- Calculus I

OR

Auxiliary Mathematics I

AND

Any 2 other Level I courses

Recommended courses:

Introductory Life Science I

Physics I

OR

Physics I (Auxiliary)

Second year

Chemistry IIA

Chemistry IIB

AND/OR

Applied Chemistry II

AND

Any other Level II course depending on other course set

Third year

Chemistry IIIA

Chemistry IIIB

AND/OR

Applied Chemistry IIIA

Applied Chemistry IIIB

OR

Any other Level III course depending on other course set ■

Chemistry with Chemical Engineering

Bachelor of Science in the field of Chemistry with Chemical Engineering

SBA04

Majors: Applied Chemistry and Chemistry

Duration

3 years

NSC Requirements

APS 43+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 6

Physical Science

Level 6

Wait-listing

Applicants with 40–42 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Administrators
- Agricultural Research
- Applied Chemical Research
- Biotechnology
- Chemical Analysis
- Chemical Services
- Consultants
- Environmental Research
- Food and Drink Technology
- Forensic Science
- Forestry Research
- Hazardous Waste Management
- Medical Research

- Patents • Pesticides Industry
- Petrochemical Industry
- Personal Care Chemistry
- Sales of Scientific Equipment
- Science Publishing
- Science Teacher
- Textile Chemistry
- Water Treatment and Analysis
- Quality Control and Management

Programme Description

Study industrial chemical processes for the production of important materials.

Chemical engineers combine the disciplines of Chemistry and Physics, expressed in mathematical language, with concepts such as course operations and reaction kinetics, to develop industrial chemical processes.

As a chemical engineer, you will build on the findings of the research chemist, who works with small amounts of materials in the laboratory. You will be concerned with the design, construction, operation, and marketing of equipment that can reproduce the processes or products developed by chemists on a large scale. These include materials needed for specialist applications in the aerospace, automotive, biomedical, and electronics industries. You might also work in biotechnology, designing bioreactors for plant cultures, or using bacteria to extract minerals from their ores, or in electronics, where you will conduct research on the synthesis of micro-electronic components.

Curriculum

First year

Chemistry I

AND

Mathematics I (Major):

- Algebra I
- Calculus I

AND

Physics I (Major)

AND

Engineering Analysis and Design IA and IB

AND

Any one course from the list below:

- Elementary Sesotho Language and Culture IA
- Elementary IsiZulu Language and Culture IA
- The International Relations of South Africa and Africa I
- Introduction to Political Studies
- Southern Africa in the Era of Globalisation I
- Identity and Society I

Second year

AND

Electrical Engineering

AND

Mathematics II (Engineering)

AND

Chemistry IIA and IIB

AND

Process Engineering Fundamentals IIA

AND

Economic Concepts IA

Third year

Applied Chemistry IIIA and IIIB

AND

Chemistry IIIA and IIIB

AND

Process Engineering

Fundamentals IIB

Astronomy and Astrophysics

Bachelor of Sciences in the field of Astronomy and Astrophysics

SBA15

Duration

3 years

Majors: Physics and Astrophysics

NSC Requirements

APS

43+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 6

Physical Science

Level 6

Wait-listing

Applicants with 40-42 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Astrophysicist
- Physicist

Programme Description

Study astronomical data and understand how the universe works.

Astrophysicists interpret astronomical data gathered by astronomers to understand how our universe works. Astronomers view the entire electromagnetic spectrum – called “Multi-Frequency Astronomy” – through optical telescopes, radio telescopes, microwaves, gamma-rays, and X-rays.

An exciting career awaits you in Astronomy and Astrophysics in South Africa, which was awarded the Square Kilometre Array (SKA) project.

This comprises a core of radio telescopes in the Karoo, and is one of many projects supported by our own South African Large Telescope (SALT), an optical telescope sited at Sutherland.

Curriculum

First year

Physics I (Major)

AND

Mathematics I (Major):

- Algebra I
- Calculus I

AND

Computational and Applied

Mathematics I

AND

Astrophysics:

- Introduction to Astronomy I
- Modern Astrophysics I

Second year

Physics II:

- Physics IIA (Major)
- Physics IIB (Major)

AND

Mathematics II:

- Multivariable Calculus II
- Introduction to Mathematical Statistics II
- Linear Algebra II

AND

Computational and Applied Mathematics II

AND

Cosmology: The Origin and Evolution of the Universe

Third year

Physics III:

- Quantum Mechanics III
- Applications of Quantum Mechanics III
- Statistical Physics III
- Waves and Modern Optics III
- Advanced Experimental Physics and Project III

Astrophysics III:

- Relativity: The Basis of Cosmology and Astrophysics III
- Advanced Astrophysics III
- Modern Radio and Gamma-ray Astronomy III





Due to various curricular and policy changes the Nuclear Science and Engineering plan is in abeyance and will therefore no longer be offered in 2020. Applicants can, however, be considered for the general BSc (SBA00), where students interested in the more fundamental aspects of Nuclear Sciences can choose projects in Nuclear Physics in the 3rd year of study. This would usually be followed by a BSc Honours which can lay the foundation for postgraduate studies in Nuclear Physics.

Applicants with more applied interests could consider a BEng (Mechanical), BEng (Industrial) or BEng (Aeronautical) Engineering qualification.

It is envisaged that a postgraduate diploma in Nuclear Sciences and Engineering offered by the University will be introduced in the near future, for those interested in acquiring a specialisation appropriate for employment in the nuclear industry.

Please visit www.wits.ac.za/undergraduate/apply-to-wits/ to view the minimum admission requirements and closing dates.

Physics

Bachelor of Science in the field of Physical Sciences (Physics)

SBA12

Major: Physics

Duration

3 years

NSC Requirements

APS

40+

English Home Language OR First Additional Language

Level 5

Mathematics

Level 6

Physical Science

Level 5

Wait-listing

Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

Careers

- Communications
- Consultants and Administrators
- Education
- Environmental Science
- Law
- Physics Research
- Project Managers
- Software Engineers

Programme Description

Study analytical and problem-solving skills in an increasingly technological society.

A degree in Physics equips you with analytical and problem-solving skills, which are in high demand. These skills also offer a background for understanding an increasingly technological society. Additionally, the course will equip you with experience for life-long learning in a rapidly

changing world; mathematical skills that can be applied in many environments; and computational skills that are marketable in many sectors of the economy.

Curriculum

First year

Physics I (Major)

AND

Mathematics I (Major):

- Algebra I
- Calculus I

AND

Chemistry I

AND

Any other Level I course

Second year

Physics II:

- Physics IIA and IIB

AND

Mathematics II:

- Abstract Mathematics II
- Differential Equations II
- Basic Analysis II
- Linear Algebra II
- Multivariable Calculus II
- Transition to Abstract Mathematics II

AND

Any other Level II course depending on other course set

Third year

Physics III:

- Advanced Experimental Physics and Project III
- Statistical Physics III
- Quantum Mechanics III
- Waves and Modern Optics III
- Applications of Quantum Mechanics III

OR

Introduction to Geophysics

AND

Any other Level III course depending on other course set

