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.

<table>
<thead>
<tr>
<th>Bachelor of Science</th>
<th>128</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad Areas of Study in Science</td>
<td>129</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Programmes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>130</td>
</tr>
<tr>
<td>Ecology and Conservation</td>
<td>131</td>
</tr>
<tr>
<td>Organismal Biology</td>
<td>132</td>
</tr>
<tr>
<td>Applied Bioinformatics</td>
<td>133</td>
</tr>
<tr>
<td>Biochemistry and Cell Biology</td>
<td>134</td>
</tr>
<tr>
<td>Genetics and Developmental Biology</td>
<td>135</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Earth Sciences</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographical and Archaeological Studies</td>
<td>137</td>
</tr>
<tr>
<td>Geological Sciences</td>
<td>138</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mathematical Sciences</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuarial Science</td>
<td>139</td>
</tr>
<tr>
<td>Computational and Applied Mathematics</td>
<td>140</td>
</tr>
<tr>
<td>Computer Science</td>
<td>141</td>
</tr>
<tr>
<td>Mathematics</td>
<td>142</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mathematics of Finance</th>
<th>143</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematical Sciences</td>
<td>144</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Sciences</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>145</td>
</tr>
<tr>
<td>Chemistry with Chemical Engineering</td>
<td>146</td>
</tr>
<tr>
<td>Astronomy and Astrophysics</td>
<td>147</td>
</tr>
<tr>
<td>Nuclear Science and Engineering</td>
<td>148</td>
</tr>
<tr>
<td>Physics</td>
<td>149</td>
</tr>
</tbody>
</table>
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; 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.

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

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

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**International Qualifications on**
page 35

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**Closing Date:** 30 September

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**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)

---

**Biodiversity**

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**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

**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

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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

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

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.

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)

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
- Biostatics
- 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

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.

Programme Description

Study life forms and their functions at the molecular level.

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
Basic Statistics for the Natural Sciences II
AND/OR
Molecular and Cell Biology IIB: Concepts
AND
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

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
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

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

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
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

**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

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

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

www.wits.ac.za/course-finder/undergraduate/science/geological-sciences/
Actuarial Science

Bachelor of Science in the field of Actuarial Science

SBA03
Majors: Actuarial Science and Mathematical Statistics
Duration
3 years

Curriculum

First year
- Actuarial Science I
- Mathematical Statistics I
- Algebra I
- Calculus I
- Microeconomics
- Macroeconomics
- Business Accounting I

Second year
- Actuarial Science II
- Mathematical Statistics 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
- Mathematical Statistics III

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.
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
Bachelor of Science in the field of Computer Science

Majors: Computer Science and Computational Applications

Duration
3 years

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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

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

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

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

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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

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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

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<td>Physical Science Level 5</td>
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Wait-listing
Applicants with 38-39 points may be wait-listed, subject to place availability.

International Qualifications on page 35

Closing Date: 30 September

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

Third year
Chemistry IIIA
Chemistry IIIB
AND/OR
Applied Chemistry IIIA
Applied Chemistry IIIB

Any other Level III course depending on other course set

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

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**Wait-listing**

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

**International Qualifications on page 35**

**Closing Date:** 30 September

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**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

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**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

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**Closed Date:** 30 September

**Programme Name:** Bachelor of Science in the field of Chemistry with Chemical Engineering

**Major:** Applied Chemistry and Chemistry

**Duration:** 3 years

**NSC Requirements**

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**Wait-listing**

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

**International Qualifications on page 35**

**Closing Date:** 30 September

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**Programme Description**

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**Curriculum**

**First year**

Chemistry I
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

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
Bachelor of Science in the field of Nuclear Science and Engineering

SBA05
Major: Physics
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

Programme Description

Study environmental issues and find solutions to the energy crisis.

The availability of energy fuels and environmental issues are two of the biggest challenges facing humanity today because of the ever-increasing usage of those fuels and the resulting impact on climate and the environment.

Knowledge and understanding of basic physics and, in particular, nuclear physics, is a prerequisite to working in the nuclear industry. Nuclear engineering requires a firm grasp of the physical principles required for a successful reactor design.

After completing three years of studies, you can study for a fourth year in Physics, to complete a BSc (Hons) Physics. Alternatively, you can enter the third year of a four-year BSc (Eng) degree in either Mechanical or Industrial Engineering to eventually complete a degree in Engineering and register as a professional engineer.

Curriculum

First year
Physics I (Major)
AND
Mathematics I (Major):
• Algebra I
• Calculus I
AND
Applied Physics
AND
Introduction to the Engineering Profession I
AND
Engineering Analysis and Design IA and IB
AND
Engineering Chemistry

Second year
Physics II:
• Physics IIA and IIB
AND
Mathematics II (Engineering)
AND
Applied Mechanics II A
AND
Computing Skills and Software Development II
AND
Introduction to Materials Science and Engineering II
AND
Basic Nuclear Physics II
AND
Introduction of Reactor Physics II

Third year
Physics III:
• Advanced Experimental Physics and Project III
• Applications of Quantum Mechanics III
• Statistical Physics III
• Quantum Mechanics III
• Waves and Modern Optics III
AND
• Fluid Mechanics II
• Introduction to Nuclear Engineering III
• Introduction to Nuclear Safety III
• Mechanical Engineering Design II
• Thermodynamics II

Careers
Examples of organisations in South Africa that employ physicists and engineers with a nuclear sciences specialty are Eskom, Nuclear Energy Corporation of South Africa (Necsa), National Nuclear Regulator (NNR) and large construction companies such as Murray and Roberts. With the unprecedented growth in nuclear industry in South Africa there is an urgent and sustained need for suitably qualified physicists and engineers.
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