

# NATIONAL DIPLOMA: ENVIRONMENTAL SCIENCES

Qualification code: NDEV02 - NQF Level 6

Campus where offered: Arcadia Campus (day classes)  
Last year of new intake: 2018  
Teach-out (phase-out) date: 31 December 2022

Students registered for this qualification should complete their studies according to the teach-out date prescribed for the qualification, subject to the stipulations of Regulation 3.1.11 and 3.1.13 in the Students' Rules and Regulations.

Information on phased-out programmes can be obtained from the TUT website, [www.tut.ac.za](http://www.tut.ac.za).

## CURRICULUM

Consult the 2018 Faculty Prospectus for the full contents of the qualification.

**SUBJECTS PRINTED IN BOLD ARE NOT FOR REGISTRATION PURPOSES.**

### FIRST YEAR

| CODE | SUBJECT | CREDIT | PREREQUISITE SUBJECT(S) |
|------|---------|--------|-------------------------|
|------|---------|--------|-------------------------|

#### FIRST SEMESTER

|                |  |         |  |
|----------------|--|---------|--|
| CHE141B        | Chemistry IA                                 | (0,100) |  |
| COS101T        | Communication Skills I                       | (0,050) |  |
| <b>EMG101T</b> | <b>Environmental Management I</b>            |         |  |
| EMG10XT        | Environmental Management: General I          | (0,075) |  |
| <b>ERS101T</b> | <b>Environmental Resources I</b>             |         |  |
| ERS10XT        | Environmental Resources: Ecosystem Ecology I | (0,075) |  |
| GEO141T        | Geology I                                    | (0,100) |  |
| MAT171T        | Mathematics I                                | (0,100) |  |

TOTAL CREDITS FOR THE SEMESTER: 0,500

#### SECOND SEMESTER

|                |   |         |  |
|----------------|---|---------|--|
| AGL111T        | Applied Geology I                             | (0,100) | Geology I                                    |
| CSK101B        | Computer Skills I                             | (0,050) |  |
| <b>EMG101T</b> | <b>Environmental Management I</b>             |         |  |
| EMG10YT        | Environmental Management: Applied I           | (0,075) | Environmental Management: General I          |
| EPS111T        | Entrepreneurial Skills                        | (0,050) |  |
| <b>ERS101T</b> | <b>Environmental Resources I</b>              |         |  |
| ERS10YT        | Environmental Resources: Population Ecology I | (0,075) | Environmental Resources: Ecosystem Ecology I |
| GTH101T        | Geotechnology I                               | (0,100) | Geology I                                    |
| MBI101T        | Microbiology I                                | (0,100) |  |

TOTAL CREDITS FOR THE SEMESTER: 0,550

TOTAL CREDITS FOR THE FIRST YEAR: **1,050**

### SECOND YEAR

| CODE | SUBJECT | CREDIT | PREREQUISITE SUBJECT(S) |
|------|---------|--------|-------------------------|
|------|---------|--------|-------------------------|

#### FIRST SEMESTER

|         |                    |         |                   |
|---------|--------------------|---------|-------------------|
| AGL211B | Applied Geology II | (0,100) | Applied Geology I |
|---------|--------------------|---------|-------------------|



|         |                             |         |                            |
|---------|-----------------------------|---------|----------------------------|
| ELE201T | Environmental Legislation   | (0,100) |                            |
| EMG201T | Environmental Management II | (0,100) | Environmental Management I |
| ENC201T | Environmental Chemistry II  | (0,100) | Chemistry IA               |
| GTH201B | Geotechnology II            | (0,100) | Geotechnology I            |

TOTAL CREDITS FOR THE SEMESTER: 0,500

### SECOND SEMESTER

|         |                                  |         |                             |
|---------|----------------------------------|---------|-----------------------------|
| EEC201T | Environmental Economy            | (0,100) |                             |
| EGE201T | Environmental Geology II         | (0,100) | Applied Geology II          |
| EMB201T | Environmental Biotechnology II   | (0,100) | Microbiology I              |
| EMS201T | Environmental Management Systems | (0,100) | Environmental Management II |
| ERS201T | Environmental Resources II       | (0,100) | Environmental Resources I   |

TOTAL CREDITS FOR THE SEMESTER: 0,500

TOTAL CREDITS FOR THE SECOND YEAR: **1,000**

### THIRD YEAR

| CODE | SUBJECT | CREDIT | PREREQUISITE SUBJECT(S) |
|------|---------|--------|-------------------------|
|------|---------|--------|-------------------------|

#### FIRST SEMESTER

|         |                                |         |                             |
|---------|--------------------------------|---------|-----------------------------|
| EMG301T | Environmental Management III   | (0,150) | Environmental Management II |
| ENV301T | Environmental Geohydrology III | (0,150) | Environmental Geology II    |
| ERS301T | Environmental Resources III    | (0,150) | Environmental Resources II  |

**plus two of the following subjects:**

|         |                             |         |                            |
|---------|-----------------------------|---------|----------------------------|
| EGE301T | Environmental Geology III   | (0,150) | Environmental Geology II   |
| ENC301T | Environmental Chemistry III | (0,150) | Environmental Chemistry II |
| GTH301T | Geotechnology III           | (0,150) | Geotechnology II           |
| IPO301T | Industrial Processes III    | (0,150) |                            |

TOTAL CREDITS FOR THE SEMESTER: 0,750

#### SECOND SEMESTER

**On completion of all the subjects in the first- and second year.**

|         |  |         |  |
|---------|--|---------|--|
| INV301T | Industrial Environmental Practice III<br>(offered in both semesters) | (0,200) |  |
|---------|--|---------|--|

TOTAL CREDITS FOR THE SEMESTER: 0,200

TOTAL CREDITS FOR THE THIRD YEAR: **0,950**

TOTAL CREDITS FOR THE QUALIFICATION: **3,000**



## SUBJECT INFORMATION (OVERVIEW OF SYLLABUS)

The syllabus content is subject to change to accommodate industry changes. Please note that a more detailed syllabus is available at the Department or in the study guide that is applicable to a particular subject. On 01 August 2018, the syllabus content was defined as follows:

### A

**APPLIED GEOLOGY I (AGL111T)** **1 X 3-HOUR PAPER**  
(*Subject custodian: Department of Environmental, Water and Earth Sciences*)  
Introductory geophysics. Introductory hydrogeology. Introductory engineering geology. (Total tuition time: ± 60 hours)

**APPLIED GEOLOGY II (AGL211B)** **1 X 3-HOUR PAPER**  
(*Subject custodian: Department of Environmental, Water and Earth Sciences*)  
South African stratigraphy and mineral deposits. (Total tuition time: ± 68 hours)

### C

**CHEMISTRY IA (CHE141B)** **1 X 3-HOUR PAPER**  
(*Subject custodian: Department of Chemistry*)  
Atomic structure, chemical bonding, periodic table of elements and nomenclature of inorganic compounds. Chemical equations and reactions and stoichiometry. Solutions, acids, bases, pH calculations and chemical equilibrium. Electrochemistry and redox reactions. Introduction to organic compounds (nomenclature and functional groups). Practical: experiments based on the theory, with the emphasis on basic laboratory techniques. (Total tuition time: ± 152 hours)

**COMMUNICATION SKILLS I (COS101T)** **CONTINUOUS ASSESSMENT**  
(*Subject custodian: Department of Applied Languages*)  
Communication theory. Oral presentation. Technical writing skills. Group communication skills. (Total tuition time: not available)

**COMPUTER SKILLS I (CSK101B)** **CONTINUOUS ASSESSMENT**  
(*Subject custodian: End User Computing Unit*)  
Students have to acquire theoretical knowledge (computing fundamentals) and practical skills as an end-user in operating systems and MS Office Suite applications (MS Word, MS Excel and MS PowerPoint) on an introductory level. Students will do online and computer based tests. The modules are mapped with SAQA and IC3 Essential Skills for Digital Literacy (international certification). (Total tuition time: ± 40 hours)

### E

**ENTREPRENEURIAL SKILLS (EPS111T)** **1 X 3-HOUR PAPER**  
(*Subject custodian: Department of Management and Entrepreneurship*)  
The various types of businesses, management functions, budgeting, accounting, administration, banking, personnel management, customer relations, and entrepreneurship versus entrepreneurship. (Total tuition time: not available)

**ENVIRONMENTAL BIOTECHNOLOGY II (EMB201T)** **1 X 3-HOUR PAPER**  
(*Subject custodian: Department of Biotechnology and Food Technology*)  
The different ecospheres that house organisms, their role in cycling in nature and the uses of micro-organisms to treat wastewater and xenobiotics. Harnessing organisms for mining and extraction of oil as well as remediation of oil spills. (Total tuition time: ± 40 hours)

**ENVIRONMENTAL CHEMISTRY II (ENC201T)** **1 X 3-HOUR PAPER**  
(*Subject custodian: Department of Chemistry*)  
Chemical fate and transport, industrial ecology, aquatic chemistry, including water analysis, sources of water pollution and water treatment methods. Chemical analysis of water and wastewaters. Toxicological chemistry. Practical: experimental techniques related to the theory. (Total tuition time: ± 96 hours)



|  |                         |
|--|-------------------------|
| <b>ENVIRONMENTAL CHEMISTRY III (ENC301T)</b><br><b>(Subject custodian: Department of Chemistry)</b>  | <b>1 X 3-HOUR PAPER</b> |
| The geosphere and geochemistry: rock cycle, sediment transport and pollution issues relating to the geosphere. Soil chemistry: composition of soil and chemical reactions that may occur in soil. Atmospheric chemistry: atmospheric physical and chemical processes, particularly the photochemical process, as well as various effects from dispersion of pollutants, sampling and analytical methods relating to atmospheric or gaseous samples. Waste: nature and sources of waste, waste minimisation at source, disposal of waste, hazardous waste, nuclear waste and agricultural chemicals. Waste and solids analysis: methods for sampling and analysis of solid environmental samples including wastes. Practical: experimental techniques related to the theory. (Total tuition time: ± 96 hours) |                         |
| <b>ENVIRONMENTAL ECONOMY (EEC201T)</b><br><b>(Subject custodian: Department of Environmental, Water and Earth Sciences)</b>  | <b>1 X 3-HOUR PAPER</b> |
| Introductory economy. Sociopolitical factors. Resource economy. Quantification of environmental risks. Environmental and economical problems and situation criteria. (Total tuition time: ± 42 hours)  |                         |
| <b>ENVIRONMENTAL GEOHYDROLOGY III (ENV301T)</b><br><b>(Subject custodian: Department of Environmental, Water and Earth Sciences)</b>   | <b>1 X 3-HOUR PAPER</b> |
| Basic concepts. Appearance and movement of groundwater. Groundwater exploration. Drilling techniques. Borehole construction, development and maintenance. (Total tuition time: ± 60 hours)   |                         |
| <b>ENVIRONMENTAL GEOLOGY II (EGE201T)</b><br><b>(Subject custodian: Department of Environmental, Water and Earth Sciences)</b>   | <b>1 X 3-HOUR PAPER</b> |
| Natural disasters. Human impact on geological environment. (Total tuition time: ± 45 hours)  |                         |
| <b>ENVIRONMENTAL GEOLOGY III (EGE301T)</b><br><b>(Subject custodian: Department of Environmental, Water and Earth Sciences)</b>  | <b>1 X 3-HOUR PAPER</b> |
| Environmental geophysics, environmental geohydrology and environmental engineering geology. (Total tuition time: ± 60 hours)   |                         |
| <b>ENVIRONMENTAL LEGISLATION (ELE201T)</b><br><b>(Subject custodian: Department of Environmental, Water and Earth Sciences)</b>  | <b>1 X 3-HOUR PAPER</b> |
| Framework of environmental law. South African legal process. Nature and scope of national, provincial and local legislation. Implementation of specific laws. Environmental impact assessment, environmental management programme. International environmental legislation and standards. International conventions and treaties. Green organisations. Quantification of legal risks. (Total tuition time: ± 42 hours)   |                         |
| <b>ENVIRONMENTAL MANAGEMENT II (EMG201T)</b><br><b>(Subject custodian: Department of Environmental, Water and Earth Sciences)</b>  | <b>1 X 3-HOUR PAPER</b> |
| Production management. Life cycle analysis. Environmental finance and cost analysis. Industrial health. (Total tuition time: ± 30 hours)   |                         |
| <b>ENVIRONMENTAL MANAGEMENT III (EMG301T)</b><br><b>(Subject custodian: Department of Environmental, Water and Earth Sciences)</b>   | <b>1 X 3-HOUR PAPER</b> |
| Environmental management strategy. Environmental audit. Environmental monitoring. Integrated environmental management. (Total tuition time: ± 42 hours)  |                         |
| <b>ENVIRONMENTAL MANAGEMENT: APPLIED I (EMG10YT)</b><br><b>(Subject custodian: Department of Environmental, Water and Earth Sciences)</b>  | <b>1 X 3-HOUR PAPER</b> |
| Introduction to environmental management. Key environmental issues, air pollution, renewable energy, climate change, solid and hazardous waste. (Total tuition time: ± 30 hours)   |                         |
| <b>ENVIRONMENTAL MANAGEMENT: GENERAL I (EMG10XT)</b><br><b>(Subject custodian: Department of Environmental, Water and Earth Sciences)</b>  | <b>1 X 3-HOUR PAPER</b> |
| Introduction to environmental management. Key environmental issues, human population and its impacts, water resources, food, soil and pest management. (Total tuition time: ± 30 hours)  |                         |
| <b>ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS201T)</b><br><b>(Subject custodian: Department of Environmental, Water and Earth Sciences)</b>   | <b>1 X 3-HOUR PAPER</b> |
| Environmental management philosophy. Formal management resources. Various uses of environmental systems. ISO 14000, BS 7750 and ERA. (Total tuition time: ± 45 hours)  |                         |



**ENVIRONMENTAL RESOURCES II (ERS201T) 1 X 3-HOUR PAPER**

**(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Environmental quality: air pollution, water pollution, solid waste, pesticides, radiation, noise. Waste management. Waste: rational use reduces waste, renewal techniques, recycling. Risk management: identifying potential risks, dealing with risks. (Total tuition time: ± 30 hours)

**ENVIRONMENTAL RESOURCES III (ERS301T) 1 X 3-HOUR PAPER**

**(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Climate studies: the South African climate, urban climate, factors that have an impact on climate. Particular environmental features: mountains, rivers, the coastal zone. Indications of environmental concerns: unofficial indicators, official indicators. (Total tuition time: ± 45 hours)

**ENVIRONMENTAL RESOURCES: ECOSYSTEM ECOLOGY I (ERS10XT) 1 X 3-HOUR PAPER**

**(Subject custodian: Department of Environmental, Water and Earth Sciences)**

General ecology: the purpose of the study of ecology, organisation of the ecosystem, ecological pyramids and population interactions. Renewable resources: soil, wild animals, freshwater systems, marine systems. Non-renewable resources: terrestrial minerals, offshore minerals. (Total tuition time: ± 45 hours)

**ENVIRONMENTAL RESOURCES: POPULATION ECOLOGY I (ERS10YT) 1 X 3-HOUR PAPER**

**(Subject custodian: Department of Environmental, Water and Earth Sciences)**

General ecology: the purpose of the study of ecology, organisation of the ecosystem, ecological pyramids and population interactions. Renewable resources: soil, wild animals, freshwater systems, marine systems. Non-renewable resources: terrestrial minerals, offshore minerals. (Total tuition time: ± 45 hours)

**G**

**GEOLOGY I (GEO141T) 1 X 3-HOUR PAPER**

**(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Introduction to earth sciences. Physical geology. Geomorphology. Pedology. Introduction to environmental geology. (Total tuition time: ± 104 hours)

**GEOTECHNOLOGY I (GTH101T) 1 X 3-HOUR PAPER**

**(Subject custodian: Department of Environmental, Water and Earth Sciences)**

The use of maps, aerial photographs and other satellite images in the earth sciences. Introduction to section drawings. Mapping techniques. (Total tuition time: ± 60 hours)

**GEOTECHNOLOGY II (GTH201B) 1 X 3-HOUR PAPER**

**(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Petrology of igneous, metamorphic and sedimentary rocks. (Total tuition time: ± 60 hours)

**GEOTECHNOLOGY III (GTH301T) 1 X 3-HOUR PAPER**

**(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Geological exploration. Mining. (Total tuition time: ± 60 hours)

**I**

**INDUSTRIAL ENVIRONMENTAL PRACTICE III (INV301T) WORK-INTEGRATED LEARNING**

**(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Students do practical application of basic theory on a structural basis. (Total tuition time: not available)

**INDUSTRIAL PROCESSES III (IPO301T) 1 X 3-HOUR PAPER**

**(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Different types of industries and processes. Alternative technologies. Waste management. (Total tuition time: ± 60 hours)



**M****MATHEMATICS I (MAT171T)****1 X 3-HOUR PAPER****(Subject/Module custodian: Department of Mathematics and Statistics)**

Basic mathematics. Differentiation. Integration. Matrices. (Total tuition time: ± 90 hours for MAT171T and ± 190 hours for MATH500)

**MICROBIOLOGY I (MBI101T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Biotechnology and Food Technology)**

General introduction. Microscopy. Protista, mycota and monera. Eucaryotes, procaryotes and viruses. Microbial nutrition. Growth and culture media. Sterilisation and control of micro-organisms. Aseptic techniques and pure culture techniques. Basic terminology and principles of microbial metabolism. Practical microbiology. (Total tuition time: ± 66 hours)

