

DIPLOMA IN WATER SCIENCE AND TECHNOLOGY

Qualification code: DPWS19 - NQF Level 6 (360 credits)

SAQA ID: 101429, CHE NUMBER: H/H16/E049CAN

Campus where offered:

Arcadia Campus

REMARKS

a. *Admission requirement(s) and selection criteria:*

Acceptance is subject to available capacity according to the Student Enrolment Plan (SEP). Once a programme is full, a waiting list will be in place to provide an opportunity for applicants to fill places of those who did not register on time. Applicants will be informed of their status per official letter from the Office of the Registrar, alternatively, they can check their application status on the TUT website, www.tut.ac.za.

• **APPLICANTS WITH A SENIOR CERTIFICATE OBTAINED BEFORE 2008:**

Admission requirement(s):

A Senior Certificate or an equivalent qualification, with a D symbol at Standard Grade or an E symbol at Higher Grade for English, Mathematics and Physical Science.

Recommended subject(s):

Biology.

Assessment procedures:

To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **18**.

• **APPLICANTS WITH A NATIONAL SENIOR CERTIFICATE OBTAINED IN OR AFTER 2008:**

Admission requirement(s):

A National Senior Certificate with a bachelor's degree or a diploma endorsement, or an equivalent qualification, with an achievement level of at least 4 for English (home language or first additional language), 4 for Mathematics or Technical Mathematics and 4 for Physical Sciences or Technical Sciences.

Recommended subject(s):

Life Sciences.

Selection criteria:

To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **21** (excluding Life Orientation).

Assessment procedures:

Applicants with an Admission Point Score (APS) of 21 and more will be considered for admission.

• **APPLICANTS WITH A NATIONAL CERTIFICATE (VOCATIONAL):**

Admission requirement(s):

- A National Certificate (Vocational) at NQF Level 4 with a diploma or bachelor's degree endorsement, with at least a 50% (APS of 4) for English (home language or first additional language), Mathematics and Science, 40% for Life Orientation (excluded for APS calculation), 50% for any other two compulsory vocational subjects; **or**
- A Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision at NQF Level 4.



Selection criteria:

To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **21** (excluding Life Orientation).

Applicants with a National N Certificate as published in Nated 191: N3 (NQF Level 4):

- A National N3 Certificate: with at least 50% for English, 50% for Mathematics N3, Engineering Science N3, and any two additional N3 subjects; **or**
- A Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision at NQF Level 4.

• **APPLICANTS WITH QUALIFICATIONS ON THE HIGHER EDUCATION QUALIFICATION SUB-FRAMEWORK (HEQSF) OFFERED BY UNIVERSITIES OF TECHNOLOGY:**

The applicant will be considered for admission to the programme, if any of the following qualifications has been completed:

- Higher Certificate in Water Treatment (NQF Level 5 - 120 credits). Exemption will be granted from equivalent modules: Computer Literacy, Communication for Academic Purpose, Life Skills, Academic Literacy, Water Technology I, Water Treatment I and Wastewater Treatment I.
 - Advanced Certificate in Water Treatment (NQF Level 6 - 120 credits). Exemption will be granted from equivalent modules: Water Microbiology I, Water Treatment II, Wastewater Treatment II, Water Analysis I, Water Chemistry I, and Water Plant Management I.
- b. *Recognition of Prior Learning (RPL), equivalence and status:*
See Chapter 30 of Students' Rules and Regulations.
- c. *Intake for the qualification:*
January only.
- d. *Presentation:*
Day classes.
- e. *Minimum duration:*
Three years.
- f. *Exclusion and readmission:*
See Chapter 2 of Students' Rules and Regulations.
- g. *Work-Integrated Learning: Water Science and Technology:*
See Chapter 5 of Students' Rules and Regulations.

CURRICULUM

FIRST YEAR

| CODE | MODULE | NQF-L | CREDIT | PREREQUISITE MODULE(S) |
|---------|------------------------------------|-------|--------|------------------------|
| ALI125X | Academic Literacy (block module) | (5) | (2) | |
| CHM105X | Chemistry I | (5) | (24) | |
| COE105X | Communication for Academic Purpose | (5) | (10) | |
| CPL105X | Computer Literacy | (5) | (10) | |
| LFS125X | Life Skills (block module) | (5) | (2) | |
| MAT105X | Mathematics I | (5) | (24) | |
| PHI105X | Physics I | (5) | (24) | |

FIRST SEMESTER

| | | | | |
|---------|----------------------|-----|------|--|
| WMB115D | Water Microbiology I | (5) | (12) | |
|---------|----------------------|-----|------|--|



SECOND SEMESTER

| | | | | |
|-----------------------------------|--------------------|-----|------------|--|
| WTE115D | Water Technology I | (5) | (12) | |
| TOTAL CREDITS FOR THE FIRST YEAR: | | | 120 | |

SECOND YEAR

| CODE | MODULE | NQF-L | CREDIT | PREREQUISITE MODULE(S) |
|------------------------------------|--------------------------|-------|------------|--|
| FIRST SEMESTER | | | | |
| WAN216D | Water Analysis I | (6) | (21) | Chemistry I Mathematics I Water Technology I |
| WCH216D | Water Chemistry I | (6) | (21) | Chemistry I Mathematics I Water Technology I |
| WMB216D | Water Microbiology II | (6) | (18) | Water Technology I Water Microbiology I |
| TOTAL CREDITS FOR THE SEMESTER: | | | 60 | |
| SECOND SEMESTER | | | | |
| WPM216D | Water Plant Management I | (6) | (18) | Water Technology I |
| WTR215D | Water Treatment I | (5) | (21) | Water Microbiology I Water Technology I |
| WWT215D | Wastewater Treatment I | (5) | (21) | Water Microbiology I Water Technology I |
| TOTAL CREDITS FOR THE SEMESTER: | | | 60 | |
| TOTAL CREDITS FOR THE SECOND YEAR: | | | 120 | |

THIRD YEAR

| CODE | MODULE | NQF-L | CREDIT | PREREQUISITE MODULE(S) |
|--|--|-------|------------|---------------------------------------|
| FIRST SEMESTER | | | | |
| WAN316D | Water Analysis II | (6) | (12) | Water Analysis I Water Chemistry I |
| WCH316D | Water Chemistry II | (6) | (12) | Water Chemistry I |
| WTR316D | Water Treatment II | (6) | (18) | Water Treatment I |
| WWT316D | Wastewater Treatment II | (6) | (18) | Wastewater Treatment I |
| SECOND SEMESTER | | | | |
| On completion of all first- second- and third-year modules. | | | | |
| WIL316D | Work-Integrated Learning: Water Science and Technology | (6) | (60) | |
| TOTAL CREDITS FOR THE THIRD YEAR: | | | 120 | |
| TOTAL CREDITS FOR THE QUALIFICATION: | | | 360 | |



MODULE 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 module. At time of publication, the syllabus content was defined as follows:

A

ACADEMIC LITERACY (ALI125X)

CONTINUOUS ASSESSMENT

(Module custodian: Directorate of Library and Information Services)

Introduction of information literacy. Development of a search strategy and application of a search string to search engines and academic databases. Evaluation of information sources. Ethical and legal use of information. (Total tuition time: not available)

C

CHEMISTRY I (CHM105X)

1 X 3-HOUR PAPER

(Module custodian: Department of Chemistry)

The role and importance of chemistry in everyday life. Classification and properties of matter. Units of measurement. Atoms, molecules and ions. The modern view of atomic structure and the use of electron configurations in chemical bonding. The periodic table of elements. The use of IUPAC rules for naming inorganic compounds. Application of the mole concept in stoichiometric calculations. Reactions in aqueous solutions. Chemical equilibrium. Fundamental concepts in electrochemistry. Organic nomenclature. (Total tuition time: ± 240 hours)

COMMUNICATION FOR ACADEMIC PURPOSE (COE105X)

1 X 3-HOUR PAPER

(Module custodian: Department of Applied Languages)

A workable knowledge of English is an essential skill for any graduate who is required to conduct themselves successfully in a professional working environment. This module will equip students with the competencies required to compose a selection of written texts related to communicating both internally and externally within a professional environment. In addition, the module includes strategies that are essential for the effective communication in various situations, including small groups to avoid unproductive conflict, a multicultural context, etc. (Total tuition time: not available)

COMPUTER LITERACY (CPL105X)

CONTINUOUS ASSESSMENT

(Module custodian: End User Computing Unit)

Introduction of information literacy. Development of a search strategy and application of a search string to search engines and academic databases. Evaluation of information sources. Ethical and legal use of information. (Total tuition time: not available)

L

LIFE SKILLS (LFS125X)

CONTINUOUS ASSESSMENT

(Module custodian: Directorate of Student Development and Support)

Academic, personal and socio-emotional skills development for students in higher education. Personal and social dimensions address: effective planning and self-management (goal setting and time management); Adjusting to university life (student life, diversity and change); Intra- and interpersonal skills development (conflict management, self-esteem, relationship management); Effective living (healthy living, HIV education, substance abuse); Academic dimension addresses: academic skills for university (e.g. critical thinking, creativity, managing assignments and assessments). (Total tuition time: not available)

M

MATHEMATICS I (MAT105X)

1 X 3-HOUR PAPER

(Module custodian: Department of Mathematics and Statistics)

Consolidation of existing knowledge of and introduction to new types of functions; solution of systems of equations using matrices; introduction to vector algebra and complex numbers; application of differentiation and integration to solve well-defined problems. (Total tuition time: ± 120 hours)



P**PHYSICS I (PH1105X)****1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Basic Mathematical Concepts for Physics and measurements. Kinematics in one dimension. Kinematics in a plane (projectile motion). Forces and Newton's Laws of Motion. Momentum and Impulse. Work, Energy and Power. Rotational Kinematics. Rotational Dynamics. Elasticity. Static and dynamic fluids. Temperature and 0th Law of Thermodynamics. Thermal Expansion and Thermal Stress. 1st Law of Thermodynamics. Heat transfer. Gas Laws. General properties of waves. Reflection. Refraction. Interference and Diffraction of waves. Electrostatics. Electric Potential Energy and Potential Difference. Electric Circuits. (Total tuition time: ± 240 hours)

W**WASTEWATER TREATMENT I (WWT215D)****1 X 3-HOUR PAPER****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Composition of wastewater, sources of wastewater and flow rates variations. Preliminary wastewater treatment, primary sedimentation, secondary wastewater treatment (attached and suspended growth processes), disinfection. Wastewater treatment for small communities (types works, applications, operation and maintenance). (Total tuition time: ± 210 hours)

WASTEWATER TREATMENT II (WWT316D)**1 X 3-HOUR PAPER****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Characteristics of nutrients in domestic wastewater, advanced wastewater treatment processes: biological nutrient removal including nitrification, denitrification and enhanced phosphate removal and chemical phosphate removal, tertiary wastewater treatment including wetland treatment, sludge treatment processes including: thickening, stabilisation, conditioning and dewatering. Sludge management and utilisation. (Total tuition time: ± 180 hours)

WATER ANALYSIS I (WAN216D)**CONTINUOUS ASSESSMENT****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Application of the following methods on potable water, wastewater, industrial effluents and mine water samples: preparation and standardisation of solutions, physical parameters, titrimetric analysis, gravimetric analysis, colorimetric analysis and chemical dosages. (Total tuition time: ± 210 hours)

WATER ANALYSIS II (WAN316D)**CONTINUOUS ASSESSMENT****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Application of the following methods on potable water, wastewater, industrial effluents and mine water samples: Ion selective electrodes analysis, spectrophotometric and colorimetric analysis, wastewater treatment control tests, chemical dosage for phosphate removal and sludge dewatering practical tests. (Total tuition time: ± 120 hours)

WATER CHEMISTRY I (WCH216D)**1 X 3-HOUR PAPER****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Introduction: Chemical equations, type of chemical reactions, calculations from chemical reaction equations, solutions and concentrations, chemical equilibrium and thermodynamics, factors affecting chemical equilibrium. Acid/base equilibria. Solubility equilibria. Oxidation-reduction equilibria. General principles of the chemical water analysis: sample preparation, titrimetric, gravimetric, turbidity, conductivity, pH, colour, tastes and odours. (Total tuition time: ± 120 hours)

WATER CHEMISTRY II (WCH316D)**1 X 3-HOUR PAPER****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Basic concepts of organic chemistry, common food related organic compounds, detergents, pesticides, trace organic compounds, behaviour of organic compounds in the environment, natural organic matter. Chemical process kinetics. Analytical techniques (ion selective electrodes, spectroscopy and colorimetric. Weathering of rocks and the influence of water quality. (Total tuition time: ± 120 hours)

WATER MICROBIOLOGY I (WMB115D)**1 X 3-HOUR PAPER****(Module custodian: Department of Environmental, Water and Earth Sciences)**

History and scope of microbiology (outlining the historical background of microbiology). Study of microbial structure, microbial nutrition, growth and control. Microbial diversity (Microbial taxonomy, Bacteria, Protozoa, Algae, Viruses). Water related diseases (Water born, Water based, Water washes, Water related insect vector, Air-borne diseases). (Total tuition time: ± 120 hours)



WATER MICROBIOLOGY II (WMB216D)**1 X 3-HOUR PAPER****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Water and Wastewater Microorganisms (Origin of microbes, types and characteristics of water wastewater, E. coli, Total coliforms, Faecal coliforms, Salmonella and Shigella spp, Microbial metabolism and growth). Environmental Water Quality Management. Microbiology and process control. Practical's (Detection, enumeration and identification of water and wastewater microorganisms, Sampling for microbial analysis, Cultural techniques, Microscopy). Indicator organisms (Coliphages, E. coli, Total coliforms, Faecal coliforms, Salmonella and Shigella spp). (Total tuition time: ± 180 hours)

WATER PLANT MANAGEMENT I (WPM216D)**1 X 3-HOUR PAPER****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Principles of general management, human resource management, employment relations and labour legislation, managing people and teams. Operations management. Inventory management, Safety management. Budgeting (types of budgets, drafting an annual budget, the use of budgeting to control costs). (Total tuition time: ± 180 hours)

WATER TECHNOLOGY I (WTE115D)**1 X 3-HOUR PAPER****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Water cycle, influence of climate and topography, rainfall mechanisms, availability of water and groundwater in South Africa, users of water sources, alternative water sources. Basic water quality. Introduction to water and wastewater treatment. Decentralised water and sanitation. Pollution (Types of pollution, Point and non-point source pollution, Heat pollution, Influence of pollution on a water source). (Total tuition time: ± 120 hours)

WATER TREATMENT I (WTR215D)**1 X 3-HOUR PAPER****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Introduction, abstraction and pre-treatment, coagulation and flocculation, sedimentation filtration, and disinfection. Operation and monitoring of the unit processes, including process related calculations and equipment. (Total tuition time: ± 210 hours)

WATER TREATMENT II (WTR316D)**1 X 3-HOUR PAPER****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Water stabilisation, Water softening. Desalination. Ion exchange. Iron and manganese removal. Fluoridation and Defluoridation. Water treatment residues. Water storage. Quality control in distribution systems (Theoretical conditions for complete attainment of water quality control, causes of poor water quality in distribution systems, operation and maintenance practices). (Total tuition time: ± 180 hours)

WORK-INTEGRATED LEARNING: WATER SCIENCE AND TECHNOLOGY (WIL316D)**WORK-INTEGRATED LEARNING****(Module custodian: Department of Environmental, Water and Earth Sciences)**

Work-Integrated Learning will be done with an accredited employer and is overseen by a mentor and departmental lecturer. A compulsory syllabus will be followed and monthly reports and a final assignment must be submitted. Students will be visited at their place of employment and will be subjected to an oral assessment. (Total tuition time: ± 600 hours)

