

**NATIONAL DIPLOMA: WATER CARE**  
**(Extended curriculum programme with foundation provision)**  
**Qualification code: NDWCF0 - 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).

Key to asterisks:

\* Information does not correspond to information on AA72.  
 (Deviations approved Senate in May 2012.)

**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)
FPCLS01	Chemistry IB: Extended*	(0,160)	
FPCOS02	Foundation Communication Skills I	(0,100)	
FPMLS01	Mathematics IB: Extended*	(0,160)	
FPPLS01	Physics IB: Extended*	(0,160)	
FPWCT01	Foundation Water Care Technology I	(0,160)	
TOTAL CREDITS FOR THE FIRST YEAR:		<b>0,740</b>	

**SECOND YEAR**

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
<b>PWA201T</b>	<b>Potable Water Analysis II</b>		
PWA20PT	Potable Water Analysis: Practical II	(0,067)	Chemistry IB: Extended Foundation Water Care Technology I Mathematics IB: Extended

**FIRST SEMESTER**

CSK101B	Computer Skills I	(0,100)	
FPBIO01	Foundation Biology	(0,090)	
LGA201T	Legal Aspects: Water II	(0,133)	Foundation Communication Skills I Foundation Water Care Technology I
<b>PWA201T</b>	<b>Potable Water Analysis II</b>		
PWA20XT	Potable Water Analysis: Theory II	(0,066)	Chemistry IB: Extended Foundation Water Care Technology I Mathematics IB: Extended



## SECOND SEMESTER

GRW201T	Groundwater II	(0,100)	Chemistry IB: Extended Foundation Water Care Technology I Mathematics IB: Extended
<b>MBI101B</b>	<b>Microbiology I</b>		
MBI10XB	Microbiology: Theory I	(0,050)	
MBI10YB	Microbiology: Practical I	(0,020)	
PMW101T	Principles of Management: Water I	(0,100)	
PTN201T	Potable Water Purification II	(0,134)	Chemistry IB: Extended Foundation Water Care Technology I Mathematics IB: Extended
TOTAL CREDITS FOR THE SECOND YEAR:		<b>0,860</b>	

## THIRD YEAR

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
<b>WSA201T</b>	<b>Wastewater Analysis II</b>		
WSA20PT	Wastewater Analysis: Practical II	(0,066)	Chemistry IB: Extended Foundation Water Care Technology I Mathematics IB: Extended Potable Water Analysis II

## FIRST SEMESTER

WBI201T	Water Biology II	(0,100)	Foundation Water Care Technology I Microbiology I
<b>WSA201T</b>	<b>Wastewater Analysis II</b>		
WSA20XT	Wastewater Analysis: Theory II	(0,067)	Chemistry IB: Extended Foundation Water Care Technology I Mathematics IB: Extended Potable Water Analysis II
WTR201T	Wastewater Treatment II	(0,134)	Chemistry IB: Extended Foundation Water Care Technology I Mathematics IB: Extended Microbiology I

## SECOND SEMESTER

<b>RMN201T</b>	<b>Research Methodology: Natural Sciences</b>		
RMN20XT	Research Methodology: Natural Sciences: Water Care	(0,050)	Chemistry IB: Extended Computer Skills I Foundation Communication Skills I Foundation Water Care Technology I Mathematics IB: Extended Microbiology I Physics IB: Extended



RMN20YT	Research Methodology: Natural Sciences: (0,050) Statistics		Chemistry IB: Extended Computer Skills I Foundation Communication Skills I Foundation Water Care Technology I Mathematics IB: Extended Microbiology I
WHY201T	Water Hydraulics II	(0,133)	Physics IB: Extended Foundation Water Care Technology I Mathematics IB: Extended
WTN301T	Water Treatment III	(0,117)	Physics IB: Extended Computer Skills I Potable Water Analysis II Potable Water Purification II
TOTAL CREDITS FOR THE THIRD YEAR:		<b>0,717</b>	

#### FOURTH YEAR

CODE	SUBJECT	CREDIT	PREREQUISITE SUBJECT(S)
<b>FIRST SEMESTER</b>			
INE301T	Industrial Effluents III	(0,116)	Legal Aspects: Water II Potable Water Purification II Wastewater Treatment II
WTI201T	Water Treatment: Investigations II	(0,117)	Potable Water Purification II Wastewater Analysis II Wastewater Treatment II
WTR301T	Wastewater Treatment III	(0,117)	Computer Skills I Wastewater Analysis II Wastewater Treatment II
TOTAL CREDITS FOR THE SEMESTER:		0,350	
<b>SECOND SEMESTER</b>			
CBW301T	Cooling and Boiler Water Technology III	(0,116)	Computer Skills I Potable Water Analysis II Potable Water Purification II
WIP201T	Water Industry: Practical II	(0,100)	Potable Water Purification II Wastewater Analysis II Wastewater Treatment II
WPL201T	Water Plant II	(0,117)	Chemistry IB: Extended Foundation Water Care Technology I Mathematics IB: Extended Physics IB: Extended
TOTAL CREDITS FOR THE SEMESTER:		0,333	
TOTAL CREDITS FOR THE FOURTH YEAR:		<b>0,683</b>	
TOTAL CREDITS FOR THE QUALIFICATION:		<b>3,000</b>	



## 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:

### C

#### **CHEMISTRY IB: EXTENDED (FPCLS01) 1 X 3-HOUR PAPER**

*(Subject custodian: Department of Chemistry)*

Scientific methodology and its use in discovering chemistry. Numbers in chemistry. The use of SI units. Matter. Atomic structure. Compounds in chemistry. The mole concept and chemical calculations. The electronic structure of the atom and electronic configurations within the periodic table. Chemical bonding. The states of matter and the binding forces within matter. Basic concepts of the gas laws. Solutions in chemistry. Acids, bases and salts. Oxidation and reduction and the balancing of equations. Organic chemistry: introduction, alkanes, alkenes, aromates, alkanols, phenols, halogen compounds, alkanooates, alkynes, aldehydes, ketones and alkanooic acids. (Total tuition time:  $\pm$  160 hours)

#### **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:  $\pm$  40 hours)

#### **COOLING AND BOILER WATER TECHNOLOGY III (CBW301T) 1 X 3-HOUR PAPER**

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

Corrosion: basic theory, forms of corrosion, combating and prevention, inhibitors, measurement. Cooling water: classification, problems, treatment, equipment. Boiler water: classification, description of installations, pre-treatment of feed water, typical problems and control. Water treatment analyses: sampling procedures and frequency, chemical analyses, interpretation of results. (Total tuition time:  $\pm$  75 hours)

### F

#### **FOUNDATION BIOLOGY (FPBIO01) 1 X 3-HOUR PAPER**

*(Subject custodian: Department of Biotechnology and Food Technology)*

Energy, control and continuity; environment; microbes and diseases; behaviour and populations; physiology and transport; genetics; ecology. (Total tuition time:  $\pm$  136 hours)

#### **FOUNDATION COMMUNICATION SKILLS I (FPCOS02) CONTINUOUS ASSESSMENT**

*(Subject custodian: Department of Applied Languages)*

Interpret, relate and reflect on all available and relevant resource material in proper English. Communicate orally in a comprehensible and clear manner in both general and subject-specific communication. Demonstrate intermediate-level proficiency in written English. (Total tuition time: not available)

#### **FOUNDATION WATER CARE TECHNOLOGY I (FPWCT01) 1 X 3-HOUR PAPER**

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

Water sources, hydrological cycle, nutrient cycles, sources of pollution, water pollution, water treatment, simple drinking water and sanitary systems, solid waste. (Total tuition time:  $\pm$  132 hours)

### G

#### **GROUNDWATER II (GRW201T) 1 X 3-HOUR PAPER**

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

South African stratigraphy and mineral deposits. (Total tuition time:  $\pm$  60 hours)



**I****INDUSTRIAL EFFLUENTS III (INE301T)****1 X 3-HOUR PAPER***(Subject custodian: Department of Environmental, Water and Earth Sciences)*

Legal aspects and tariffs, purification policy, re-use and disposal, treatment of wastewater, specific problems with industrial effluents, water economy in industry and the assimilation of effluents. (Total tuition time: ± 36 hours)

**L****LEGAL ASPECTS: WATER II (LGA201T)****1 X 3-HOUR PAPER***(Subject custodian: Department of Environmental, Water and Earth Sciences)*

Introduction and background to legislation. National Water Act, 1998 (Act No. 36 of 1998). Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and Water Services Act, 1997 (Act No. 108 of 1997). (Total tuition time: ± 75 hours)

**M****MATHEMATICS IB: EXTENDED (FPMLS01)****1 X 3-HOUR PAPER***(Subject custodian: Department of Mathematics and Statistics)*

Arithmetic. Graphs. Functions. Basic algebra. Trigonometry. Differentiation. Mensuration. Basic statistics. (Total tuition time: ± 190 hours)

**MICROBIOLOGY: PRACTICAL I (MBI10YB)****CONTINUOUS ASSESSMENT***(Subject custodian: Department of Biotechnology and Food Technology)*

Microbial diversity, bacteria, fungi, protozoa, viruses, microbial growth and culture techniques, microscopy, staining techniques, sterilisation, disinfection and control, enumeration of bacteria and fungi. (Total tuition time: ± 21 hours)

**MICROBIOLOGY: THEORY I (MBI10XB)****1 X 3-HOUR PAPER***(Subject custodian: Department of Biotechnology and Food Technology)*

Microbial diversity, bacteria, fungi, protozoa, viruses, microbial growth and culture techniques, microscopy, staining techniques, sterilisation, disinfection and control, enumeration of bacteria and fungi. (Total tuition time: ± 45 hours)

**P****PHYSICS IB: EXTENDED (FPPLS01)****1 X 3-HOUR PAPER***(Subject custodian: Department of Physics)*

A general physics qualification with applications in the biological sciences: remedial mathematics, fundamental units, vectors and scalars, kinetics, mechanics, dynamics, momentum, work, energy and power, fluids, temperature and heat, gas laws, waves and sound, optics, electricity, magnetism, radioactivity. Practical: experiments related to the theory. (Total tuition time: ± 160 hours)

**POTABLE WATER ANALYSIS: PRACTICAL II (PWA20PT)****CONTINUOUS ASSESSMENT***(Subject custodian: Department of Environmental, Water and Earth Sciences)*

Application of the following methods on potable water samples: physical parameters, titrimetric methods, colorimetric methods, spectrophotometry, flame photometry. (Total tuition time: ± 240 hours)

**POTABLE WATER ANALYSIS: THEORY II (PWA20XT)****1 X 3-HOUR PAPER***(Subject custodian: Department of Environmental, Water and Earth Sciences)*

Determination of physical parameters. Titrimetric methods, colorimetric methods. Analytical procedures. Data processing. Spectrophotometry, flame photometry. (Total tuition time: ± 75 hours)

**POTABLE WATER PURIFICATION II (PTN201T)****1 X 3-HOUR PAPER***(Subject custodian: Department of Environmental, Water and Earth Sciences)*

Domestic water quality, tastes and odours, aeration, pre-treatment, coagulation, flocculation, sedimentation, filtration, disinfection. (Total tuition time: ± 165 hours)



**PRINCIPLES OF MANAGEMENT: WATER I (PMW101T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Management and Entrepreneurship)**

Management principles: introduction to management, the business economics environment, the enterprise and its functions, introduction to management functions. Human resource functions: introduction to the human as an employer. Basic labour relations for supervisors. (Total tuition time: not available)

**R****RESEARCH METHODOLOGY: NATURAL SCIENCES: STATISTICS (RSY20YT)****1 X 3-HOUR PAPER****(Subject custodian: Department of Mathematics and Statistics)**

A general introduction to research methodology, which includes the planning and execution of the research process, as well as the different types of research and research strategies. Basic principles of measurements and methods of data collection. (Total tuition time: not available)

**RESEARCH METHODOLOGY: NATURAL SCIENCES: WATER CARE (RMN20XT)****CONTINUOUS ASSESSMENT****(Subject custodian: Department of Environmental, Water and Earth Sciences)**

General introduction to research methodology, planning and execution of the research process, as well as the different research types and research strategies. Basic principles of measurement and data collection methods. (Total tuition time: ± 45 hours)

**W****WASTEWATER ANALYSIS: PRACTICAL II (WSA20PT)****CONTINUOUS ASSESSMENT****(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Application of the following methods on wastewater samples, industrial effluents and mine water: physical parameters, titrimetric methods. Determination of oxygen and nitrogen parameters, flame atomic absorption spectrophotometry. Colorimetric and spectrophotometric methods. Introduction to chromatography. (Total tuition time: not available)

**WASTEWATER ANALYSIS: THEORY II (WSA20XT)****1 X 3-HOUR PAPER****(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Determination of physical parameters. Titrimetric methods, gravimetric methods, colorimetric methods. Other instrumental methods. Analyses of industrial effluents. Mine water analysis. Process control analysis. (Total tuition time: ± 90 hours)

**WASTEWATER TREATMENT II (WTR201T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Characteristics of sewage. Screening and the removal of grit. Primary and secondary sedimentation. Biological processes. Disinfection. Small sewage treatment works. Micro-organisms and their role in wastewater treatment. (Total tuition time: ± 90 hours)

**WASTEWATER TREATMENT III (WTR301T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Tertiary treatment. Advanced treatment. Sludge treatment. (Total tuition time: ± 92 hours)

**WATER BIOLOGY II (WBI201T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Limnology. Aquatic ecosystems: rivers, lakes, dams, wetlands. Physical and chemical properties of natural waters. Aquatic toxicology. Practicals: biomonitoring. (Total tuition time: ± 90 hours)

**WATER HYDRAULICS II (WHY201T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Physics)**

Operation of pumps. Sluice gates. Types of pumps. Flow measurement, valves, Level measurement, head, water hammer/cavitation. Operational procedures, calculations, liquids and fluids, pipelines, canals and hydraulic structures. (Total tuition time: ± 90 hours)

**WATER INDUSTRY: PRACTICAL II (WIP201T)****CONTINUOUS ASSESSMENT****(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Practicals at selected wastewater treatment plants, including relevant wastewater analysis. (Total tuition time: ± 240 hours)



**WATER PLANT II (WPL201T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Standardisation and measurements. Principles of corrosion. On-line analyses. Process control. Material and energy balances. Heat transfer. Chemical dosing. (Total tuition time: ± 90 hours)

**WATER TREATMENT III (WTN301T)****1 X 3-HOUR PAPER****(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Stabilisation, softening, iron and manganese removal, demineralisation. Membrane technology, adsorption, ozone, fluoridation, ion exchange, sludge disposal. (Total tuition time: ± 90 hours)

**WATER TREATMENT: INVESTIGATIONS II (WTI201T)****CONTINUOUS ASSESSMENT****(Subject custodian: Department of Environmental, Water and Earth Sciences)**

Practicals at selected potable water purification plants, including relevant water analysis. (Total tuition time: ± 285 hours)

