

# POSTGRADUATE DIPLOMA IN INDUSTRIAL PHYSICS

PGDip (Industrial Physics) - NQF Level 8 (120 credits)

**Qualification code: PDIP22**

(Specialisation codes for admission and registration: PDIO22 / PDNT22)

SAQA ID: 111157, CHE NUMBER: H/H16/E095CAN

Campus where offered: Arcadia Campus

## REMARKS

- a. *Admission requirement(s):*  
An Advanced Diploma in Industrial Physics, or a three-year bachelor's degree with Physics as a major, or an equivalent qualification at NQF Level 7.  
  
Holders of any other equivalent South African or international qualification may also be considered, see Chapter 1 of Students' Rules and Regulations.
- b. *Selection criteria:*  
Admission is subject to selection. Prospective students will be evaluated based on the marks obtained in the previous qualification and/or work experience.  
  
Acceptance is subject to available capacity according to the Student Enrolment Plan (SEP). 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.
- c. *Recognition of Prior Learning (RPL), equivalence and status:*  
See Chapter 30 of Students' Rules and Regulations.
- d. *Intake for the qualification:*  
January only.
- e. *Presentation:*  
Block-mode classes. The offering of the two-year block-mode classes will only be offered to working students and is subject to sufficient capacity.
- f. *Minimum duration:*  
A minimum of one or two years (depending on the programme offering).
- g. *Exclusion and readmission:*  
See Chapter 2 of Students' Rules and Regulations.
- h. *Re-registration:*  
A student may re-register for the module Industrial Physics Research Project only with the permission of the Head of the Department. The purpose of the re-registration is to provide students with an opportunity to complete the project only, and not to redo it, should they fail the module.

## CURRICULUM

### ATTENDANCE

CODE	MODULE	NQF-L	CREDIT
<b>FIRST SEMESTER</b>			
IDV118G	Industrial Ventilation II	(8)	(12)



QSS118G	Quantum and Solid State Physics II	(8)	(12)
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## SECOND SEMESTER

ATN118G	Analytical Techniques for Nanotechnology	(8)	(12)
PHO118G	Photovoltaic Technology	(8)	(12)

**plus one of the following options. Students should have the necessary underbuild on NQF Level 7 for the chosen option:**

### Nuclear Technology (PDNT22):

ANB108G	Accelerators and Nuclear Reactors II	(8)	(18)
NTR108G	Industrial Physics Research Project	(8)	(36)
NTR118R	Industrial Physics Research Project (re-registration) (first-semester module, see paragraph h)	(8)	(0)
RPD108G	Radiation Protection Dosimetry II	(8)	(18)

### Photonics (PDIO22):

IOR108G	Industrial Physics Research Project	(8)	(36)
IOR118R	Industrial Physics Research Project (re-registration) (first-semester module, see paragraph h)	(8)	(0)
LFO108G	Laser and Fibre Optics II	(8)	(18)
OPD108G	Optical Design II	(8)	(18)

TOTAL CREDITS FOR THE QUALIFICATION: **120**

## 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

**ACCELERATORS AND NUCLEAR REACTORS II (ANB108G) 1 X 3-HOUR PAPER**  
(Module custodian: Department of Physics)

Accelerator physics; Ion beams in materials science and technology; Nuclear reactor theory and technology; Nuclear waste management; and Socio-economic impact of nuclear technology. (Total notional time: 180 hours)

**ANALYTICAL TECHNIQUES FOR NANOTECHNOLOGY (ATN118G) 1 X 3-HOUR PAPER**  
(Module custodian: Department of Physics)

Scanning electron microscopy; Secondary ion mass spectrometry; X-ray diffraction; UV-Vis spectrophotometry; and FTIR spectrometry. (Total notional time: 120 hours)



**I****INDUSTRIAL PHYSICS RESEARCH****PROJECT ASSESSMENT****PROJECT (IOR108G, IOR118R, NTR108G, NTR118R)***(Module custodian: Department of Physics)*

Identification of research problems; Review of relevant literature; Formulation of research proposal; Experimental techniques and methods; Data analysis methods and techniques; and Project report and presentation. (Total notional time: 360 hours)

**INDUSTRIAL VENTILATION II (IDV118G)****1 X 3-HOUR PAPER***(Module custodian: Department of Physics)*

Industrial water and electricity; Developments in ventilation; Mechanised mining; Ventilation requirements in a mine; Sampling of airborne dust and diesel particulates; Gases encountered in mines; Illumination in mines. Tunnel ventilation; and Arranged tour to a mine. (Total notional time: 120 hours)

**L****LASER AND FIBRE OPTICS II (LFO108G)****1 X 3-HOUR PAPER***(Module custodian: Department of Physics)*

Stimulated emission devices and optical amplifiers and lasers; Photo-detectors and image sensors; Polarisation and modulation of light; Optical amplification; wavelength conversion and regeneration; Integrated optics and photonics; Optical fibre systems: intensity modulation/direct detection; Optical fibre systems: coherent and phase-modulated; Optical fibre measurements; and Optical networks. (Total notional time: 180 hours)

**O****OPTICAL DESIGN II (OPD108G)****1 X 3-HOUR PAPER***(Module custodian: Department of Physics)*

Introduction: Lens designer work; Meridional ray tracing; Paraxial rays and 1<sup>st</sup> order optics; Diffraction in optical systems; Basics of lens design; Systems of several lenses and thick lenses; Simple optical systems and photographic lenses; Complex photographic lenses; Visual, telescope systems and microscopes; and Lens design optimisation. (Total notional time: 180 hours)

**P****PHOTOVOLTAIC TECHNOLOGY (PHO118G)****1 X 3-HOUR PAPER***(Module custodian: Department of Physics)*

Solar cell and PV modules; Current-voltage characterisation; PV system components; and PV system simulation. (Total notional time: 120 hours)

**Q****QUANTUM AND SOLID STATE PHYSICS II (QSS118G)****1 X 3-HOUR PAPER***(Module custodian: Department of Physics)*

The time-independent Schrodinger Equation; Quantum mechanics in three dimensions; Identical particles, Crystallography; and Solid state electronics: energy bands in crystals, carrier concentrations, mobility and conductivity, the p-n junction, semiconductor-metal junctions. (Total notional time: 120 hours)

**R****RADIATION PROTECTION DOSIMETRY II (RPD108G)****1 X 3-HOUR PAPER***(Module custodian: Department of Physics)*

Radiation-matter interactions; Ionising radiation in biological matter; Internal radiation dose assessment; Environmental radiation dosimetry; Occupational radiation dosimetry; and Non-ionising radiation and dosimetry. (Total notional time: 120 hours)

