

ADVANCED DIPLOMA IN INDUSTRIAL PHYSICS

AdvDip (Industrial Physics) - NQF Level 7 (120 credits)

Qualification code: ADIP19

(Specialisation codes for admission and registration: ADIO19 / ADNT19)

SAQA ID: 102065, CHE NUMBER: H/H16/E056CAN

Campus where offered: Arcadia Campus

REMARKS

- a. *Admission requirement(s):*
A three-year Diploma/National Diploma in Industrial Physics (on NQF Level 6), **or** a three-year bachelor of science degree with a Physics major, **or** any three-year diploma/national diploma with a Physics major (on NQF Level 6 with a minimum of 360 credits).
- b. *Selection criteria:*
Admission is subject to selection. Qualifying applicants will be admitted based on their average final-year mark of their preceding 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:*
Day or evening classes. (The offering of evening classes is subject to sufficient capacity and will be offered over a period of two years).
- 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.

CURRICULUM

ATTENDANCE

CODE	MODULE	NQF-L	CREDIT
APA107V	Advanced Physics I (year module)	(7)	(24)
ELM117V	Electromagnetism (first-semester module)	(7)	(12)
IPA107V	Industrial Physics IV (year module)	(7)	(30)

plus three of the following electives in either Nuclear Technology or Photonics:

Nuclear Technology (ADNT19):

ANB117V	Accelerators and Nuclear Reactors I (second-semester module)	(7)	(12)
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ORP107V	Occupational Radiation Protection I (year module)	(7)	(18)
RPD107V	Radiation Protection Dosimetry I (year module)	(7)	(24)

Photonics (ADIO19):

LFO107V	Laser and Fibre Optics I (year module)	(7)	(24)
OPD107V	Optical Design I (year module)	(7)	(18)
RPB117V	Radiometry and Photometry (second-semester module)	(7)	(12)

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 I (ANB117V) 1 X 3-HOUR PAPER
(Module custodian: Department of Physics)

Accelerator ion sources; accelerator technologies; applications of accelerators; nuclear reactor physics; nuclear power reactors; and applications of research reactors. (Total notional time: 120 hours)

ADVANCED PHYSICS I (APA107V) 2 X 3-HOUR PAPERS
(Module custodian: Department of Physics)

Part A (paper I): Solid State and Quantum Mechanics - Crystallography; Electron theory of solids; Semiconductor device theory; Wave-particle duality; Schrodinger wave equation: wave function, interpretation, standard solutions, tunneling and first order time independent perturbation theory. Part B (paper II): Thermodynamics and Statistical Mechanics - Ideal and real gases; First, Second and Third laws of thermodynamics; Thermodynamic potentials: Legendre transformations, Maxwell relations; Classical statistical thermodynamics: ensembles, Maxwell-Boltzmann statistics; and Quantum statistical physics: Bose-Einstein and Fermi-Dirac statistics. (Total notional time: 240 hours)

E

ELECTROMAGNETISM (ELM117V) 1 X 3-HOUR PAPER
(Module custodian: Department of Physics)

Vector analysis; electrostatics and magnetostatics; sources of magnetic fields; electrodynamics; Maxwell's equations and applications: Gauss', Ampere's and Faraday's Laws; electromagnetic waves; antennas and radiation; and electromagnetic radiation: solar energy. (Total notional time: 120 hours)

I

INDUSTRIAL PHYSICS IV (IPA107V) 2 X 3-HOUR PAPERS
(Module custodian: Department of Physics)

Part A (Paper I): Ventilation - Mechanical ventilation; ventilation networks; heat in mines; refrigeration; dust; compressed air. Part B (Paper II): Renewable Energy - Renewable energy technologies; Solar thermal systems; Solar photovoltaic systems; Concentrating solar power; and Wind power plants. (Total notional time: 300 hours)



L**LASER AND FIBRE OPTICS I (LFO107V)****1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Wave Nature of Light; Dielectric Waveguides and Optical Fibres; Semiconductor Science and Light-emitting Diodes; Stimulated Emission Devices Optical Amplifiers and Lasers; Photodetectors and Image Sensors; Polarisation and Modulation of Light; Optical Fibres and Cables; Optical Fibre Connections; and Joints Couplers and Isolators. (Total notional time: 240 hours)

O**OCCUPATIONAL RADIATION PROTECTION I (ORP107V)****1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Introductory nuclear physics; Dosimetry quantities, units and calculations; Biological effects of ionizing radiation; Principles of radiation protection; International framework and regulatory control; Assessment of internal and external exposure doses; Protection against occupational exposure; and Exposure due to practices. (Total notional time: 180 hours)

OPTICAL DESIGN I (OPD107V)**1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Foundation of Geometrical Optics; Mirrors and prism systems; Imaging with a thin lens; Gaussian imagery; Object-Image relationships; Paraxial optics; Gaussian reduction; Paraxial raytracing; Stops and pupils; and Radiative transfer; Vignetting. (Total notional time: 180 hours)

R**RADIOMETRY AND PHOTOMETRY (RPB117V)****1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Fundamental concepts of radiometry; Fundamental concepts of photometry; Black bodies and other sources; Source/receiver flux transfer calculations; Optical properties of materials; Detection of radiation; Radiometers and photometers; and Basic concepts of Colour Science. (Total notional time: 120 hours)

RADIATION PROTECTION DOSIMETRY I (RPD107V)**1 X 3-HOUR PAPER****(Module custodian: Department of Physics)**

Radiation-matter interactions; Ionising radiation in biological matter; Radiation detectors; Radiation dosimetry; Counting statistics and measurement uncertainty; Calibration of dosimeters; Non-ionising radiation; and Non-ionising radiation protection dosimetry. (Total notional time: 240 hours)

