University of Pretoria Yearbook 2025

BSc in Physics 4-year programme (02131008)

Department	Physics
Minimum duration of study	4 years
Total credits	516
NQF level	07

Programme information

This is an extended BSc degree programme with a four-year curriculum that is only presented on a full-time basis. It is designed to enable students, who show academic potential, to obtain a BSc degree.

This programme is directed at a general formative education in the natural sciences. It provides the student with a broad academic basis to continue with postgraduate studies and prepares the student for active involvement in a wide variety of career possibilities.

1. Students who are admitted to one of the BSc four-year programmes register for one specific programme.
2. These programmes are followed by students who, as a result of exceptional circumstances, will benefit from an extended programme.
3. Students who do not comply with the normal three-year BSc entrance requirements for study in the Faculty of Natural and Agricultural Sciences, may nevertheless be admitted to the Faculty in one of the BSc four-year programmes. Generally, an extended programme means that the first study year is extended to take two years. The possibility of switching over to other faculties after one or two years in the four-year programmes exists. This depends on selection rules and other conditions stipulated by the other faculties.
4. Applications for admission to the BSc four-year programmes should be submitted in accordance with the UP applications process, with applications considered up to 30 June and in a second round in August/September. Details are obtainable from the Student Administration at the Faculty of Natural and Agricultural Sciences.
5. The rules and regulations applicable to the mainstream study programmes apply mutatis mutandis to the BSc four-year programmes, with exceptions as indicated in the regulations pertaining to the BSc four-year programmes. For instance, students admitted into the BSc four-year programmes must have a National Senior Certificate with admission for degree purposes.

Admission requirements

Important information for all prospective students for 2025

The admission requirements below apply to all who apply for admission to the University of Pretoria with a **National Senior Certificate (NSC) and Independent Examination Board (IEB) qualifications. Click here for this Faculty Brochure.**

Minimum requirements
Achievement level

English Home Language or English First Additional Language	Mathematics	Physical Sciences	APS
NSC/IEB	NSC/IEB	NSC/IEB	
58%	58%	58%	**32**

Life Orientation is excluded when calculating the APS.

Applicants currently in Grade 12 must apply with their final Grade 11 (or equivalent) results.

Applicants who have completed Grade 12 must apply with their final NSC or equivalent qualification results.

Please note that meeting the minimum academic requirements does not guarantee admission.

Only students that have completed school in the last two years and have not studied at a tertiary institution will be considered for this programme.

Successful candidates will be notified once admitted or conditionally admitted.

Unsuccessful candidates will also be notified.

Applicants should check their application status regularly on the UP Student Portal at click here.

Applicants with qualifications other than the abovementioned should refer to the International undergraduate prospectus 2025: Applicants with a school leaving certificate not issued by Umalusi (South Africa), available at click here.

International students: Click here.

Examinations and pass requirements

Academic promotion requirements
Students who do not show progress during the first semester of the first year will be referred to the Admissions Committee of the Faculty.
It is expected of students who register for the first year of the BSc four-year programmes to pass all the prescribed modules of the first year.

Progression requirement
The first year is foundational to the mainstream modules that follow; students will be limited to repeating two foundation modules during year 2 of study. Students may apply for internal transfers at the end of year 2. Not all mainstream programmes will be accessible; the Faculty's transfer guide will clearly outline all possibilities and the overarching objective will be that approved transfers will not involve adding an additional year of study.

Curriculum: Year 1

Minimum credits: 100

Fundamental = 20
Core = 80

Fundamental modules

Academic information management 111 (AIM 111) - Credits: 4.00
Academic information management 121 (AIM 121) - Credits: 4.00
Language, life and study skills 133 (LST 133) - Credits: 6.00
Language, life and study skills 143 (LST 143) - Credits: 6.00
Academic orientation 102 (UPO 102) - Credits: 0.00

Core modules

Foundational biology 137 (BIO 137) - Credits: 8.00
Foundational biology 147 (BIO 147) - Credits: 8.00
Foundational chemistry 137 (CMY 137) - Credits: 8.00
Foundational chemistry 147 (CMY 147) - Credits: 8.00
Foundational physics 137 (PHY 137) - Credits: 8.00
Foundational physics 147 (PHY 147) - Credits: 8.00
Foundational statistics 137 (STC 137) - Credits: 8.00
Foundational statistics 147 (STC 147) - Credits: 8.00
Foundational mathematics 137 (WTW 137) - Credits: 8.00
Foundational mathematics 147 (WTW 147) - Credits: 8.00

Curriculum: Year 2

Minimum credits: 128

Core = 64
Elective = 64

Additional information:
Students must select elective modules with a total number of at least 64 credits according to the following streams:

- **Mathematics as second major**: Due to the modules prescribed for the BSc (Physics) module, taking mathematics as a second major in 3rd year is possible for all options. Please select one of the options below.
- **Second major in applied mathematics or mathematical statistics**: WTW 115, WTW 152, WTW 162, WTW 123, WST 111, WST 121 (64 credits)
- **Second major in chemistry or applied mathematics**: CMY 117, CMY 127, WTW 162, WTW 123, WTW 115, WTW 152 (64 credits)
- **Second major in chemistry or mathematical statistics**: CMY 117, CMY 127, WST 111, WST 121 (64 credits)
- **Second major in chemistry or geology**: CMY 117, CMY 127, GLY 155, GLY 163 (64 credits)
- **Second major in chemistry or meteorology**: WKD 155 (16, S1), BME 120 (16, S2), GMC 110 (10, S2), [one of SCI 154 (16, S1), WST 111 (16, S1) or CMY 117 (16, S1)] and [one of WTW 123 (8, S2), WTW 162 (8, S2), CMY 127(16, S2, prerequisite CMY 117)] (32 + 34 (or 42) = 66 (or 74) credits)
- **Second major in chemistry with interest in biophysics**: CMY 117, CMY 127, MLB 111, GTS 161, BOT 161 (64 credits)
- **Second major in chemistry with interest in astronomy**: CMY 117, CMY 127, WTW 162, WTW 123, SCI 154 (64 credits)
- **Second major in applied mathematics with an interest in astronomy**: WTW 115, WTW 152, WTW 162, WTW 123, SCI 154, COS 132 (64 credits) note: semesters unbalanced – Year credits: S1:80, S2:48
- **Computational physics**: WTW 123, COS 132, COS 110, COS 122, COS 151 (64 credits note: semesters unbalanced – Year credits: S1:56, S2: 72)

Core modules

First course in physics 114 (PHY 114) - Credits: 16.00
First course in physics 124 (PHY 124) - Credits: 16.00
Calculus 114 (WTW 114) - Credits: 16.00
Mathematics 124 (WTW 124) - Credits: 16.00

Elective modules

Biometry 120 (BME 120) - Credits: 16.00
Plants and society 161 (BOT 161) - Credits: 8.00
General chemistry 117 (CMY 117) - Credits: 16.00
General chemistry 127 (CMY 127) - Credits: 16.00
Program design: Introduction 110 (COS 110) - Credits: 16.00
Operating systems 122 (COS 122) - Credits: 16.00
Imperative programming 132 (COS 132) - Credits: 16.00
Introduction to geology 155 (GLY 155) - Credits: 16.00

Earth history 163 (GLY 163) - Credits: 16.00
Cartography 110 (GMC 110) - Credits: 10.00
Introductory genetics 161 (GTS 161) - Credits: 8.00
Molecular and cell biology 111 (MLB 111) - Credits: 16.00
Exploring the universe 154 (SCI 154) - Credits: 16.00
Atmospheric structure and processes 155 (WKD 155) - Credits: 16.00
Mathematical statistics 111 (WST 111) - Credits: 16.00
Mathematical statistics 121 (WST 121) - Credits: 16.00
Discrete structures 115 (WTW 115) - Credits: 8.00
Numerical analysis 123 (WTW 123) - Credits: 8.00
Mathematical modelling 152 (WTW 152) - Credits: 8.00
Dynamical processes 162 (WTW 162) - Credits: 8.00

Curriculum: Year 3

Minimum credits: 144

Core = 96
Elective = 48

Additional information:
Students must select elective modules with a total number of at least 48 credits according to the following streams:

- **Mathematics as second major**: Due to the modules prescribed for the BSc (Physics) module, taking mathematics as a second major in 3rd year is possible for all options.
- **Second major applied mathematics**: WTW 286 (12, S1), WTW 221 (12, S2) and PHY 210 (24, S2) (48 credits). WTW 285 (12, S2) may be taken additionally.
- **Second major statistics**: WST 211, WST 221 (48 credits)
- **Second major in chemistry**: CMY 282, CMY 283, CMY 284, CMY 285 (48 credits)
- **Second major in geology**: GLY 253, GLY 263 (48 credits)
- **Second major in meteorology**: WKD 261 (12, Q3), WKD 254 (12, S2), ENV 201 (14, Q2), WKD 263 (14, S1), WKD 265 (12, Q4) (28 + 36 = 64 credits). Note: due to the excess credits in the second year it is recommended that students doing a second major in meteorology enrol for ENV 201 in their third year of study
- **Interest in astronomy**: PHY 210, WTW 221, WTW 286 (48 credits) note: semester unbalanced: Year credits S1: 60, S2: 84)
- **Interest in computational physics**: COS 210, COS 212, COS 226, COS 284 (56 credits) note: 24 + 32 = 56 credits = excess of 8 credits in second semester

Core modules

Waves, thermodynamics and modern physics 255 (PHY 255) - Credits: 24.00
General physics 263 (PHY 263) - Credits: 24.00
Linear algebra 211 (WTW 211) - Credits: 12.00
Calculus 218 (WTW 218) - Credits: 12.00
Analysis 220 (WTW 220) - Credits: 12.00
Vector analysis 248 (WTW 248) - Credits: 12.00

Elective modules

Physical chemistry 282 (CMY 282) - Credits: 12.00
Analytical chemistry 283 (CMY 283) - Credits: 12.00
Organic chemistry 284 (CMY 284) - Credits: 12.00
Inorganic chemistry 285 (CMY 285) - Credits: 12.00
Theoretical computer science 210 (COS 210) - Credits: 8.00
Data structures and algorithms 212 (COS 212) - Credits: 16.00
Concurrent systems 226 (COS 226) - Credits: 16.00
Computer organisation and architecture 284 (COS 284) - Credits: 16.00
Environmental sciences 201 (ENV 201) - Credits: 14.00
Process geomorphology 252 (GGY 252) - Credits: 12.00
Geomorphology of the built environment 265 (GGY 265) - Credits: 12.00
Geographic data analysis 220 (GIS 220) - Credits: 14.00

Sedimentology 253 (GLY 253) - Credits: 24.00
Remote sensing 220 (GMA 220) - Credits: 14.00
Astronomy for physicists 210 (PHY 210) - Credits: 24.00
Programming in meteorology 254 (WKD 254) - Credits: 12.00
Physical meteorology 261 (WKD 261) - Credits: 12.00
Introduction to dynamic meteorology 263 (WKD 263) - Credits: 14.00
Satellite meteorology 265 (WKD 265) - Credits: 12.00
Mathematical statistics 211 (WST 211) - Credits: 24.00
Mathematical statistics 221 (WST 221) - Credits: 24.00
Linear algebra 221 (WTW 221) - Credits: 12.00
Techniques of analysis 224 (WTW 224) - Credits: 12.00
Differential equations 256 (WTW 256) - Credits: 8.00
Numerical methods 263 (WTW 263) - Credits: 8.00
Discrete structures 285 (WTW 285) - Credits: 12.00
Differential equations 286 (WTW 286) - Credits: 12.00

Curriculum: Final year

Minimum credits: 144

Core = 72
Elective = 72

Additional information:
Students who want to register PHY 353 and PHY 363 must make sure, before registration, that a suitable project and supervisor has been confirmed with the head of department.
Students must select elective modules with a total number of at least 72 credits from the following streams:

- **Mathematics as second major**: WTW 310, WTW 320, WTW 381 and WTW 389 (72 credits)
- **Applied Mathematics as second major**: At least four of WTW 310, WTW 382, WTW 383, 386 and WTW 387 (72 of 90 credits)
- **Mathematical statistics as second major**: WST 311, WST 312, WST 321, STK 353 (79 credits) Unbalanced: 36 + 43
- **Chemistry as second major**: CMY 382, CMY 383, CMY 384, CMY 385 (72 credits)
- **Geology as second major**: GLY 370 and GLY 367 (72 credits)
- **Meteorology as second major**: WKD 352, WKD 361, WKD 315, WKD 316 (72 credits). Note: due to the excess credits in the second year it is recommended that students doing a second major in physics enrol for ENV 201 in their third year of study
- **Astronomy, astrophysics and high energy physics**: PHY 300, PHY 310, WTW 383 (72 credits)
- **Interest in computational physics**: COS 314, COS 344, COS 333, COS 330 (72 credits)

Core modules

Physical chemistry 382 (CMY 382) - Credits: 18.00
Analytical chemistry 383 (CMY 383) - Credits: 18.00
Organic chemistry 384 (CMY 384) - Credits: 18.00
Inorganic chemistry 385 (CMY 385) - Credits: 18.00
Artificial intelligence 314 (COS 314) - Credits: 18.00
Computer security and ethics 330 (COS 330) - Credits: 18.00
Programming languages 333 (COS 333) - Credits: 18.00
Computer graphics 344 (COS 344) - Credits: 18.00
Economic geology 367 (GLY 367) - Credits: 36.00
Structural geology and hydrogeology 370 (GLY 370) - Credits: 36.00
Observational astronomy 300 (PHY 300) - Credits: 36.00
Particle and astroparticle physics 310 (PHY 310) - Credits: 18.00
Physics project 353 (PHY 353) - Credits: 12.00
Physics project 363 (PHY 363) - Credits: 12.00
The science of data analytics 353 (STK 353) - Credits: 18.00
Mid-latitude and polar meteorology 315 (WKD 315) - Credits: 18.00
Tropical meteorology 316 (WKD 316) - Credits: 18.00
Multivariate analysis 311 (WST 311) - Credits: 18.00
Stochastic processes 312 (WST 312) - Credits: 18.00
Time-series analysis 321 (WST 321) - Credits: 18.00
Analysis 310 (WTW 310) - Credits: 18.00
Complex analysis 320 (WTW 320) - Credits: 18.00

Algebra 381 (WTW 381) - Credits: 18.00
Dynamical systems 382 (WTW 382) - Credits: 18.00
Numerical analysis 383 (WTW 383) - Credits: 18.00
Partial differential equations 386 (WTW 386) - Credits: 18.00
Continuum mechanics 387 (WTW 387) - Credits: 18.00
Geometry 389 (WTW 389) - Credits: 18.00

Elective modules

Physical chemistry 382 (CMY 382) - Credits: 18.00
Analytical chemistry 383 (CMY 383) - Credits: 18.00
Organic chemistry 384 (CMY 384) - Credits: 18.00
Inorganic chemistry 385 (CMY 385) - Credits: 18.00
Artificial intelligence 314 (COS 314) - Credits: 18.00
Computer security and ethics 330 (COS 330) - Credits: 18.00
Programming languages 333 (COS 333) - Credits: 18.00
Computer graphics 344 (COS 344) - Credits: 18.00
Economic geology 367 (GLY 367) - Credits: 36.00
Structural geology and hydrogeology 370 (GLY 370) - Credits: 36.00
Observational astronomy 300 (PHY 300) - Credits: 36.00
Particle and astroparticle physics 310 (PHY 310) - Credits: 18.00
Physics project 353 (PHY 353) - Credits: 12.00
Physics project 363 (PHY 363) - Credits: 12.00
The science of data analytics 353 (STK 353) - Credits: 18.00
Mid-latitude and polar meteorology 315 (WKD 315) - Credits: 18.00
Tropical meteorology 316 (WKD 316) - Credits: 18.00
Multivariate analysis 311 (WST 311) - Credits: 18.00
Stochastic processes 312 (WST 312) - Credits: 18.00
Time-series analysis 321 (WST 321) - Credits: 18.00
Analysis 310 (WTW 310) - Credits: 18.00
Complex analysis 320 (WTW 320) - Credits: 18.00
Algebra 381 (WTW 381) - Credits: 18.00
Dynamical systems 382 (WTW 382) - Credits: 18.00
Numerical analysis 383 (WTW 383) - Credits: 18.00
Partial differential equations 386 (WTW 386) - Credits: 18.00
Continuum mechanics 387 (WTW 387) - Credits: 18.00
Geometry 389 (WTW 389) - Credits: 18.00

General Academic Regulations and Student Rules

The General Academic Regulations (G Regulations) and General Student Rules apply to all faculties and registered students of the University, as well as all prospective students who have accepted an offer of a place at the University of Pretoria. On registering for a programme, the student bears the responsibility of ensuring that they familiarise themselves with the General Academic Regulations applicable to their registration, as well as the relevant faculty-specific and programme-specific regulations and information as stipulated in the relevant yearbook. Ignorance concerning these regulations will not be accepted as an excuse for any transgression, or

basis for an exception to any of the aforementioned regulations. The G Regulations are updated annually and may be amended after the publication of this information.

Regulations, degree requirements and information

The faculty regulations, information on and requirements for the degrees published here are subject to change and may be amended after the publication of this information.

University of Pretoria Programme Qualification Mix (PQM) verification project

The higher education sector has undergone an extensive alignment to the Higher Education Qualification Sub-Framework (HEQSF) across all institutions in South Africa. In order to comply with the HEQSF, all institutions are legally required to participate in a national initiative led by regulatory bodies such as the Department of Higher Education and Training (DHET), the Council on Higher Education (CHE), and the South African Qualifications Authority (SAQA). The University of Pretoria is presently engaged in an ongoing effort to align its qualifications and programmes with the HEQSF criteria. Current and prospective students should take note that changes to UP qualification and programme names, may occur as a result of the HEQSF initiative. Students are advised to contact their faculties if they have any questions.