



DEPARTMENT OF GEOGRAPHY, GEOINFORMATICS AND METEOROLOGY

BSc Meteorology

2023

This information brochure is a guide only. For the latest on the chosen degree please visit the UP website at www.up.ac.za.

1. METEOROLOGY

Meteorology is the study of atmospheric phenomena. This covers the physics, chemistry, and dynamics of the atmosphere, but extends to include many direct effects of the atmosphere on the earth's surface, the oceans, and life in general. Weather and climate are fundamental in people's lives; everyday activities like farming, travel and construction are highly affected by them but severe weather events may cause loss of life and widespread destruction to infrastructure that is worth hundreds of millions of Rands. In the long term, changes in the climate system may even determine whether humankind survives or not.

Our graduates aim to have a complete understanding of atmospheric processes, which enables accurate prediction of atmospheric conditions at several different time scales. These include nowcasting on a short time scale (minutes to hours ahead) to seasonal and climate prediction on the longer time scales. Meteorologists are employed by institutions involved in the study, interpretation, and prediction of weather and phenomena relating to the climate. As the climate changes, and we understand the damages from extreme weather events better, other large industries like manufacturing, logistics, insurance, and engineering increasingly use the services of meteorologists in impact assessments.

2. JOB OPPORTUNITIES

A BSc in Meteorology provides promising career opportunities along with the chance to understand and solve social and environmental issues that help contribute to society at large. Professional meteorologists work as weather forecasters, researchers, climatologists, and lecturers. Meteorologists are employed by institutions involved in the study, interpretation, and prediction of weather and phenomena relating to the climate. The South African Weather Service (SAWS), the Council for Scientific and Industrial Research (CSIR), some universities, agricultural institutions, municipalities, and industries employ meteorologists who mainly practice as specialists. Graduates from our program can work in the following capacities:

- **Researchers:** All aspects of weather and climate are researched to improve our understanding of atmospheric phenomena. Atmospheric modellers use supercomputers to simplify and solve complex flow dynamic equations of the atmosphere. Air quality and the effect of air pollution on society are constantly monitored, and the impact of climate change receives increasing attention.
- **Weather forecasters:** They analyse data and predict the weather by using models run on supercomputers. Weather forecasts are issued on different time scales, from very short-range forecasting to forecasts that are valid for months ahead, as well as seasonal forecasts. Some private positions, such as presenting the weather forecast on television, are available.
- **Climatologists:** They manage important data sets that contain large volumes of information gathered by SAWS and other organisations.
- **Meteorologists:** They work as consultants in the private sector and at universities to provide specialised research services.

- **Academic positions:** These are available at some South African universities for candidates who have completed a master's or doctoral degree in Meteorology. Academics ensure that the training of meteorologists meets international standards.

3. ACCREDITATION

The University of Pretoria is the only university in Southern Africa offering a BSc (Meteorology) degree, it is the only degree of its kind offered in sub-Saharan Africa and once you have completed the undergraduate degree you can continue with your studies in our Honours program. Students who successfully complete the BSc Meteorology and BSc (Hons) Meteorology programs conform to all the requirements for a meteorologist according to the definition of the World Meteorological Organization (WMO) Technical Regulations. Our graduates are able to professionally apply, develop, and communicate meteorological science for the benefit of society. A BScHons Meteorology graduate can work anywhere in the world as a meteorologist. To be considered for the BScHons Meteorology degree, you should first complete your BSc Meteorology degree.

4. APPLICATION, SELECTION AND ADMISSION REQUIREMENTS

The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.

Admission into the BSc Meteorology is an Admission Point Score (APS) score of **34**. Life Orientation is excluded in the calculation of the APS. Grade 11 results are used for the provisional admission of prospective students. Final admission is based on the Grade 12 results. English, Mathematics and Physical Science are Grade 12 level prerequisites. A minimum score of 60% for English, Mathematics and Physical Sciences is required for admission into the programme.

Candidates who do not comply with the minimum admission requirements for BSc Meteorology may be considered for admission to the BSc – Extended program for the Physical Sciences. The BSc – Extended program takes place over a period of four years instead of the normal three years. A minimum APS score of **28** is required for entry to the **BSc - Extended program for the Physical Sciences**. Selection takes place before admission and the number of places is limited.

Online application is available on www.up.ac.za, click on 'Study > Apply' in the top menu.

There is no set closing date for applications for non-selection programmes for 2023. Admission will be based on the availability of places. When the available number of places for a specific programme have been filled, the programme will be closed for further applications. Applicants are therefore strongly advised and encouraged to submit their applications as soon as possible after 1 April 2022.

Once accepted into BSc Meteorology, the university will inform you when your classes are scheduled to start. The orientation program for new 1st-year students usually commences towards the end of January/beginning of February.

5. MODULES AND CREDITS

BSc Meteorology is a three-year program. The timetable is announced at the beginning of the year. Classes and practical sessions are scheduled during the week from 07:30 to 17:20. The timetable is set out by the university.

1ST YEAR MODULES

Students are advised to choose elective modules based on the requirements for a second major of interest. It is the student's responsibility to ensure that all prerequisites are taken into account. Electives must be chosen according to the combinations below with a view to pursuing specialisation in the relevant field. Students

continue with the electives pertaining to the specific second major chosen, through to the second and third years of study.

- **Applied mathematics** as second major: WST 111, WTW 123, WTW 162 (32 credits)
- **Geography and environmental science** as second major: GGY 156, GGY 166, ENV 101 and one of [ZEN 161, WTW 123] (32 credits)
- **Geoinformatics** as second major: INF 154, INF 112, INF 164, WTW 123 (38 credits)
- **Statistics** as second major: STK 110, STC 122, WTW 123 (34 credits).
- **Zoology** as second major: ZEN 161, BOT 161, MLB 111 (32 credits)

Code	Module name	Credits	Period
Fundamental modules (compulsory):			
AIM 111	Academic information management 111	4	S1
AIM 121	Academic information management 121	4	S2
LST 110	Language and study skills	6	S1
UPO 102	Academic orientation	0	Y
Core modules (compulsory):			
BME 120	Biometry 120	16	S2
GMC 110	Cartography 110	10	S2
PHY 114	First course in physics 114	16	S1
WKD 155	Atmospheric structure and processes 155	16	S1
WTW 114	Calculus 114	16	S1
WTW 124	Mathematics 124	16	S2
Elective modules:			
BOT 161	Plants and society 161	8	S2
CMY 117	General chemistry 117	16	S1
CMY 127	General chemistry 127	8	S2
ENV 101	Introduction to environmental sciences 101	8	Q1
GGY 156	Aspects of human geography 156	8	Q2
GGY 166	Southern African geomorphology 166	8	Q3
GLY 155	Introduction to geology 155	16	S1
GLY 163	Earth history 163	16	S2
INF 112	Informatics 112	10	S2
INF 254	Informatics 154	10	S1
INF 164	Informatics 164	10	S2
MLB 111	Molecular and cell biology 111	16	S1
PHY 124	First course in physics 124	16	S2
SCI 154	Exploring the universe 154	16	S1
STC 122	Statistics 122	13	S2
STK 110	Statistics 110	13	S1
WST 111	Mathematical statistics 111	16	S1
WST 121	Mathematical statistics 121	16	S2
WTW 123	Numerical analysis 123	8	S2
WTW 162	Dynamical processes 162	8	S2
ZEN 161	Animal diversity 161	8	S2

Minimum credits: 120

2ND YEAR MODULES

Students must continue with electives pertaining to the second major chosen in the first year of study.

- **Applied mathematics** as second major: WTW 218, WTW 286, WTW 248, WTW 211, WTW 220 (60 credits)
- **Geography and environmental science** as second major: GGY 201, GGY 252, GGY 283, GIS 220, GMA 220 (68 credits)
- **Geoinformatics** as second major: GMA 220, GGY 283, GIS 220, INF 214, INF 225, INF 261 (77 credits)
- **Statistics** as second major: STK 210, STK 220, WST 212 and one of [GGY 283, GMA 220, GIS 220] (66 credits)
- **Zoology** as second major: ZEN 251, ZEN 261, GGY 283, GMA 220 and choose one of [BOT 251, PLG 251, PPK 251, WTW 218, WTW 264, WTW 286] (64 or 67 credits).

Code	Module name	Credits	Period
Core modules (compulsory):			
ENV 201	Environmental sciences 201	14	Q2
WKD 254	Programming in meteorology 254	12	Q3
WKD 261	Physical meteorology 261	12	Q3
WKD 263	Introduction to dynamic meteorology 263	14	S1
WKD 265	Satellite meteorology 265	12	Q4
Elective modules:			
BOT 251	South African flora and vegetation 251	12	S1
GGY 201	City, structure, environment and society	14	Q3
GGY 252	Process geomorphology 252	12	Q2
GGY 283	Introductory geographic information systems 283	14	S1
GIS 220	Geographic data analysis 220	14	S2
GKD 250	Introductory soil science 250	12	S1
GMA 220	Remote sensing 220	14	S1
INF 214	Informatics 214	14	S1
INF 225	Informatics 225	14	S2
INF 261	Informatics 261	7	S2
PHY 255	Waves, thermodynamics and modern physics 255	24	S1
PHY 263	General physics 263	24	S2
PLG 251	Introduction to crop protection 251	12	S1
PPK 251	Sustainable crop production and agroclimatology 251	15	S2
STK 210	Statistics 210	20	S1
STK 220	Statistics 220	20	S2
SUR 220	Surveying 220	14	S2
WST 211	Mathematical statistics 211	24	S1
WST 212	Applications in data science 212	12	S1
WST 221	Mathematical statistics 221	24	S2
WTW 211	Linear algebra 211	12	S1
WTW 218	Calculus 218	12	S1
WTW 220	Analysis 220	12	S2
WTW 248	Vector analysis 248	12	S2
WTW 264	Differential equations 264	12	S2

Code	Module name	Credits	Period
WTW 286	Differential equations 286	12	S1
ZEN 251	Invertebrate biology 251	12	Q1
ZEN 261	African vertebrates 261	12	Q3

Minimum credits: 124

3RD YEAR MODULES

Students must continue with electives pertaining to the second major chosen in the previous years of study.

- **Applied mathematics** as second major: WTW 382, WTW 383, WTW 386 and WTW 387 (72 credits)
- **Geography and environmental science** as second major: ENV 301, GGY 301, GGY 361 and GIS 310 (76 credits)
- **Geoinformatics** as second major: GMA 320, GIS 310, GIS 311, GMC 310 (88 credits). Students who are accepted for BSc (Hons) Geoinformatics will have to complete GIS 320 in addition to the other Honours modules.
- **Statistics** as second major: STK 310, STK 320 and STK 353 (75 credits)
- **Zoology** as second major: ZEN 351, ZEN 352, ZEN 353, ZEN 354 (72 credits)

Code	Module name	Credits	Period
Core modules (compulsory):			
WKD 352	Synoptic-scale circulation dynamics and vorticity in mid-latitudes 352	18	Q3
WKD 315	Mid-latitude and polar meteorology 315	18	Q1
WKD 316	Tropical meteorology 316	18	Q2
WKD 361	Quasi-geostrophic analysis 361	18	Q4
Elective modules:			
ENV 301	Human environmental interactions 301	18	Q2
GGY 301	Theories and applications of human geography 301	18	Q2
GGY 361	Environmental geomorphology 361	18	Q4
GIS 310	Geographic information systems 310	22	S1
GIS 311	Geoinformatics 311	22	S1
GKD 320	Soil chemistry 320	14	S2
GMA 320	Remote sensing 320	22	S2
GMC 310	Geometrical and space geodesy 310	22	S1
PHY 356	Electronics, electromagnetism and quantum mechanics 356	36	S1
PHY 364	Statistical mechanics, solid state physics and modelling 364	36	S2
STK 310	Statistics 310	25	S1
STK 320	Statistics 320	25	S2
STK 353	The science of data analytics 353	25	S2
WDE 310	Principles of veld management 310	12	S1
WST 311	Multivariate analysis 311	18	S1
WST 321	Time-series analysis 321	18	S2
WTW 382	Dynamic systems 382	18	S1
WTW 383	Numerical analysis 383	18	S2
WTW 386	Partial differential equations 386	18	S2
WTW 387	Continuum mechanics 387	18	S1

Code	Module name	Credits	Period
ZEN 351	Population ecology 351	18	Q1
ZEN 352	Mammalogy 352	18	Q4
ZEN 353	Community ecology 353	18	Q3
ZEN 354	Evolutionary physiology 354	18	Q4

Minimum credits: 144

For detailed module descriptions, please consult the University's website *Study > Yearbooks*. Select *Faculty of Natural and Agricultural Sciences* on the left, click on *Undergraduate Degree*, and then *BSc Meteorology* on the right.

6. FEES, FUNDING AND BURSARIES OPPORTUNITIES

For information about fees and funding (including scholarships and bursaries, visit the UP website, www.up.ac.za, click 'Study' > 'Fees and Funding'.

External bursaries and studentships are also available. For example, by the South African Weather Service (www.weathersa.co.za), click on 'Careers' then 'Bursaries') and the CSIR (www.csir.co.za, click on 'Menu' > 'Careers' in the top menu). **Closing dates of the South African Weather Service and CSIR bursaries are usually towards the end of October and July, respectively.**

7. INFORMATION FOR INTERNATIONAL STUDENTS

Information for international students is available on the UP website, www.up.ac.za, click on 'Study' in the top menu, then on 'International Students'.

8. FREQUENTLY ASKED QUESTIONS

I did not have mathematics and/or physical science at school, will I still be considered for the BSc Meteorology degree?

Unfortunately, you will not be considered.

I did not achieve the minimum 60% for physical science or mathematics at school. Will I still be considered for the BSc Meteorology degree?

Unfortunately, you will not be considered. However, we recommend that you apply for the BSc – Extended program for the Physical Sciences. After completing the first year of the extended programme, you may be able to enrol in BSc Meteorology.

I am currently a UP student enrolled for a different degree and would like to change my program to BSc Meteorology. What is the process?

The department does not handle applications for change of degrees. Please contact the Faculty of Natural and Agricultural Sciences undergraduate program administrative coordinator. Details can be found at <https://www.up.ac.za/faculty-of-natural-agricultural-sciences/article/32486/office-of-the-dean>. Alternatively contact Dr. Mpho Mmadi (mpho.mmadi@up.ac.za), and Mrs. Chandre O'Reilly (chandre.dreyer@up.ac.za), the Faculty advisors for advice regarding career choices.

9. CONTACT DETAILS

Please email any enquiries to:

Dr Thando Ndarana (academic advisor), thando.ndarana@up.ac.za

Website: <https://www.up.ac.za/ggm>, click on 'Study' > 'Our Programmes'.