University of Pretoria Yearbook 2017

BScHons Meteorology (02240074)

Duration of study	1 year
Total credits	135

Programme information

Renewal of registration

i. Subject to exceptions approved by the Dean, on the recommendation of the head of department, and in the case of distance education where the Dean formulates the stipulations that will apply, a student may not sit for an examination for the honours degree more than twice in the same module.
ii. A student for an honours degree must complete his or her study, in the case of full-time students, within two years and, in the case of after-hours students, within three years of first registering for the degree and, in the case of distance education students, within the period stipulated by the Dean. Under special circumstances, the Dean, on the recommendation of the head of department, may give approval for a limited extension of this period.

In calculating marks, General Regulation G.12.2 applies.

Apart from the prescribed coursework, a research project is an integral part of the study.

Admission requirements

In addition to the requirements of General Regulations G.1.3 and G.62 an appropriate bachelor's degree is a prerequisite: a candidate with an average of less than 60% in the major subjects in the final year of the bachelor’s degree will only be admitted with the approval of the Dean on the recommendation of the head of department. Additional conditions may be prescribed by the head of department.

A BSc in Meteorology degree

OR

An appropriate bachelor’s degree with second-year mathematics and first-year physics.

WKD 155 Atmospheric structure and processes
WKD 164 Climate and weather of Southern Africa
WKD 261 Physical meteorology
GMA 220 Remote sensing
WKD 263 Introduction to dynamical meteorology
WKD 352 Atmospheric vorticity and divergence
WKD 361 Quasi-geostrophic analysis
WKD 366 Fundamentals of weather forecasting
WTW 114 Calculus*

WTW 128 Calculus* AND WTW 126 Linear algebra* OR WTW 124
WTW 218 Calculus*
WTW 248 Vector Analysis *
PHY 171 First course in physics* or PHY 114 and PHY 124
(*or an equivalent qualification as approved by the head of the department.)

Pass with distinction

The BScHons degree is awarded with distinction to a candidate who obtains a weighted average of at least 75% in all the prescribed modules and a minimum of 65% in any one module.

Curriculum: Final year

Minimum credits: 135

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Core credits: 99

Elective credits: 36

Other programme-specific information:

Appropriate honours modules from the other disciplines in the Department or Faculty may be taken on approval by the Honours coordinator or Head of Department.

Core modules

Numerical modelling: applications 704 (WKD 704)

Module credits	12.00
Prerequisites	No prerequisites.
Contact time	1 discussion class per week, 1 lecture per week
Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Semester 1

Module content

Initial atmospheric state, observation network, data assimilation, initialization, parameterisation, post-processing. Ensemble methods, probability forecasting, forecast verification. Global circulation models, limited-area and mesoscale models, variable resolution models, dispersion models. Seamless prediction. Practical applications.

Dynamic meteorology 706 (WKD 706)

Module credits	16.00
Prerequisites	No prerequisites.
Contact time	1 practical per week, 1 lecture per week
Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Semester 1 or Semester 2

Module content

Atmospheric oscillations: Linear perturbation theory (shallow water gravity waves, inertia gravity waves, Rossby waves). Baroclinic instability. Two-layer model. Energetics of Baroclinic waves. Zonally averaged circulation. Angular momentum budget. Lorenz energy cycle. Programming in metereology.

Overview of tropical and mid-latitude meteorology 731 (WKD 731)

Module credits	12.00

Prerequisites	No prerequisites.
Contact time	1 lecture per week, 1 discussion class per week
Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Semester 1 or Semester 2

Module content

An overview of the weather and climate of the tropics and the mid-latitudes. Air masses. Instability and cloud formation. Weather systems of the tropics and mid-latitudes. Analysis of weather systems by utilising remote sensed data.

Research project 763 (WKD 763)

Module credits	35.00
Prerequisites	No prerequisites.
Contact time	1 lecture per week, 1 discussion class per week
Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Year

Module content

Introduction to the philosophy of scientific research. Hypothesis testing. Reporting of scientific research. Identification of an appropriate research project. Compilation of a research proposal. Literature survey. Acquisition and manipulation of information. Introduction to innovative strategy and research management. Preparation of a research report (or paper). Presentation of research findings.

Radar meteorology 707 (WKD 707)

Module credits	12.00
Contact time	1 lecture per week, 1 discussion class per week
Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Semester 1 or Semester 2

Module content

Basic principles and characteristics of the weather radar. The influence of the atmosphere on the propogation of electro-magnetic waves. Weather radar equation. The influence of attenuation on observations. The measurement of precipation with a radar. Doppler Radar. Convective storm analysis with radar.

Satellite meteorology 733 (WKD 733)

Module credits	12.00
Contact time	1 lecture per week, 1 discussion class per week

Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Semester 1 or Semester 2

Module content

Overview of the basic principles of satellite imagery. Types of meteorological satellites. Basic principles of radiation. The different images available, their resolution and the advantages and limitations of each image. Image interpretation.

Elective modules

Seasonal and climate modelling 703 (WKD 703)

Module credits	12.00
Prerequisites	No prerequisites.
Contact time	1 discussion class per week, 1 lecture per week
Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Semester 1 or Semester 2

Module content

Fundamentals of seasonal forecasting. The El Niño/Southern Oscillation. Empirical orthogonal functions. Canonical correlation analysis. Empirical forecast models practical. Sea-surface temperature models. Fully coupled and two-tiered general circulation modelling. Dynamical and empherical downscaling techniques. Significance testing using Monte Carlo techniques. Modelling pitfalls. User application forecasting. Projections of decadal and multi dacadal climate anomalies.

Boundary layer meteorology 719 (WKD 719)

Module credits	12.00
Prerequisites	No prerequisites.
Contact time	1 lecture per week, 1 discussion class per week
Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Semester 1 or Semester 2

Module content

Introduction to, and the importance of the boundary layer. Structure of the boundary layer. Transfer of heat (molecular and turbulent). Impacts of the turbulent nature of the boundary layer on the dynamics of atmospheric motions. Closure and boundary layer parameterisation. Applications to air pollution dispersion.

Cloud dynamics 781 (WKD 781)

Module credits	12.00

Prerequisites	No prerequisites.
Contact time	1 discussion class per week, 1 lecture per week
Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Semester 1 or Semester 2

Module content

Scaling and interpretation of equations of motion for mesoscale processes. The role of stability and other trigger actions on initial cloud formation and the evolution of clouds. Shallow and deep convective processes. Tropical and mid-latitude cloud generation processes and characteristics. Cloud splitting. Parameterisation of radiation and heat in atmospheric models. Microphysics parameterisations in numerical models.

Mesoscale meteorology 734 (WKD 734)

Module credits	12.00
Contact time	1 discussion class per week, 1 lecture per week
Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Semester 1 or Semester 2

Module content

An introduction to mesoscale meteorology. Surface mesoscale features, instability, severe storm classification and thunderstorms, flooding and flash flooding events.

Selected themes 736 (WKD 736)

Module credits	12.00
Contact time	1 lecture per week, 1 discussion class per week
Language of tuition	Module is presented in English
Academic organisation	Geography, Geoinf + Meteor
Period of presentation	Semester 1 or Semester 2

Module content

A module on an aspect or aspects of meteorology not covered in the existing options with special emphasis in Cloud microphysics and Basic concepts of numberical modelling.