Course Specifications
Valid as from the academic year 2017-2018

Meteorology and Hydrology (I000655)

Course specifications

Lecturers in academic year 2018-2019
Steppe, Kathy
Verhoest, Niko

Course offerings and teaching methods in academic year 2018-2019
A (semester 1) Dutch

Contact hrs

- seminar: practical PC room classes
- seminar: coached exercises
- excursion
- guided self-study
- lecture
- group work

Study time 135 h

12.5 h
7.5 h
2.5 h
5.0 h
25.0 h
7.5 h

Offered in the following programmes in 2018-2019
Bachelor of Science in Bioscience Engineering (main subject Land and Forest Management)

Teaching languages
Dutch

Keywords
Meteorological and hydrological phenomena, formation of clouds, precipitation, evapotranspiration, discharge, weather maps, weather stations

Position of the course
This course gives a first introduction to meteorological and hydrological processes which are on the basis of weather formation and of the hydrological cycle. Emphasis is put on the radiation balance, temperature, the formation of clouds, precipitation, evapotranspiration and discharge. Also the registration of the variables which drive these processes is studied. The student should, at the end of the course, be able to interpret weather maps.

Contents

Theory

Partim Meteorology

1. Atmospheric phenomena
   - Longwave and shortwave radiation balance
   - Air pressure, air humidity, air stability
   - Thermical stratification of the atmosphere
   - Ionosphere and magnetosphere

2. Cloud formation and precipitation
   - Principles of psychrometry
   - Condensation nuclei and cloud formation
   - Properties of cloud families and cloud types
   - Formation of fog, rain and snow

3. Weather elements
   - Air masses and source regions

(Course size (nominal values; actual values may depend on programme)
Credits 5.0
Study time 135 h
Contact hrs 60.0 h)

Offering
Bachelor of Science in Bioscience Engineering (main subject Land and Forest Management) 5 A

(Approved)
- Coupled convection systems
- Fronts and associated cloud types
- Dynamics of frontal depressions

4. Elements of weather maps
- Isobaric lines, pressure gradients and pressure zones
- Wind speed and wind direction
- Warm, cold stationary and occluded fronts
- Interpretation of weather maps

**Partim Hydrology**

1. Precipitation
   - Measurement
   - Point- versus spatial precipitation
   - Analysis of precipitation time series
   - Precipitation under vegetation
2. Evapotranspiration
   - Energy balance method
   - Aerodynamic method
   - Combination method
   - Evapotranspiration of crops
   - Measurement devices
3. Groundwater, infiltration and surface runoff
   - Groundwater: definition and measurement
   - Soil moisture: definition and measurement
   - Flow in the (un)saturated zone
   - Infiltration: definition, Green and Ampt, time to ponding, Time Compression Approximation, measurement
   - Surface runoff: mechanisms and measurement
4. Discharge
   - Definition
   - Variable source areas
   - Baseflow: definition and baseflow separation
   - Runoff coefficients
   - Unit hydrogram
   - Discharge measurements

**Exercises**

1. Discussion of meteorological sensors and weather stations
2. Group work weather station
3. Calculation of fluxes of sensible and latent heat (evapotranspiration) and the hydrological balance from climatological data
4. Setting up a measurement system, computer exercises and excursion

**Initial competences**

Meteorology and Hydrology builds on certain learning outcomes of course unit Physics 4: Physical Transport Phenomena; or the learning outcomes have been achieved differently.

1. Basic knowledge of meteorological and hydrological processes
2. Insight in weather formation and the interpretation of weather maps
3. Knowledge of the different elements in the hydrological cycle
4. Acquainted with the registration of meteorological and hydrological variables, and the application of weather stations.

**Final competences**

1. Basic knowledge of meteorological and hydrological processes
2. Insight in weather formation and the interpretation of weather maps
3. Knowledge of the different elements in the hydrological cycle
4. Acquainted with the registration of meteorological and hydrological variables, and the application of weather stations.

**Conditions for credit contract**

Access to this course unit via a credit contract is determined after successful competences assessment

**Conditions for exam contract**

This course unit cannot be taken via an exam contract

**Teaching methods**

Guided self-study, excursion, group work, lecture, seminar: coached exercises, seminar: practical PC room classes

**Learning materials and price**

Course notes are available.

(Approved)
References

Course content-related study coaching
Individual coaching is possible.

Evaluation methods
end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period
Oral examination

Examination methods in case of periodic evaluation during the second examination period
Oral examination

Examination methods in case of permanent evaluation
Assignment

Possibilities of retake in case of permanent evaluation
examination during the second examination period is possible in modified form

Calculation of the examination mark
Part Meteorology (50%)
- Theoretical exam (35%)
- Practical exam (10%)
- Group work (5%)
Part Hydrology (50%)
- Theoretical exam (35%)
- Practical exercises (15%)

Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examinator.