

## Structure of the Universe (C004221)

**Course size** *(nominal values; actual values may depend on programme)*

**Credits 6.0**

**Study time 180 h**

**Course offerings and teaching methods in academic year 2025-2026**

A (semester 1)

Dutch

Gent

lecture

seminar

**Lecturers in academic year 2025-2026**

van der Wel, Arjen

WE05

lecturer-in-charge

**Offered in the following programmes in 2025-2026**

**crdts**

**offering**

[Bachelor of Science in Physics and Astronomy](#)

6

A

[Master of Science in Teaching in Science and Technology\(main subject Mathematics\)](#)

6

A

[Master of Science in Mathematics](#)

6

A

[Preparatory Course Master of Science in Physics and Astronomy](#)

6

A

[Preparatory Course Master of Science in Physics and Astronomy](#)

6

A

**Teaching languages**

Dutch

**Keywords**

Structure formation, large-scale structure, galaxy formation

**Position of the course**

This course unit belongs to the learning pathway "Astronomy" in the Bachelor program Physics and Astronomy.

This course builds on "Stars and Planets" and "Galaxies", and focusses on the structure of the Universe on the largest scales. The cosmic background radiation contains unique information about the content and shape of the Universe, and also the initial conditions for the emergence of structure in the form of galaxies. The main goal of the course is to provide a quantitative, physical understanding of the processes that explain the observed content of the Universe.

**Contents**

- Cosmic background radiation
- Structure formation (linear and non-linear)
- Galaxy formation: intergalactic gas, cooling and star formation
- Galaxy evolution
- Black hole formation and AGN
- Galaxy groups and clusters
- Gravitational lensing

**Initial competences**

Successful completion of the courses "Stars and Planets" and "Extragalactic Astronomy" or having acquired the necessary competences in another way.

**Final competences**

Understand the relation between physics (gravity, hydrodynamics) and astronomy (observation of structure and galaxies).

**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**

Seminar, Lecture

### **Study material**

Type: Syllabus

Name: Syllabus

Indicative price: Free or paid by faculty

Optional: no

Additional information: available through Ufora

Type: Slides

Name: Slides

Indicative price: Free or paid by faculty

Optional: no

Additional information: available through Ufora

### **References**

- "An Introduction to Modern Astrophysics", B.W. Carroll & D.A. Ostlie, Pearson Education Limited 2014
- "Galaxy Formation and Evolution", H. Mo, F. van den Bosch & S. White, Cambridge University Press

### **Course content-related study coaching**

The material is thoroughly explained during the lectures. The lecturer and teaching assistant(s) are available for additional coaching. Interactive support via Ufora. For longer personal contact with the lecturer and teaching assistant(s): on appointment.

### **Assessment moments**

end-of-term assessment

### **Examination methods in case of periodic assessment during the first examination period**

Written assessment with open-ended questions

### **Examination methods in case of periodic assessment during the second examination period**

Written assessment with open-ended questions

### **Examination methods in case of permanent assessment**

### **Possibilities of retake in case of permanent assessment**

not applicable

### **Extra information on the examination methods**

- Theory: written exam
- Exercises: the students can use the slides and exercises

### **Calculation of the examination mark**

- Theory: 10/20
- Exercises: 10/20