

# Algemene relativiteit in de sterrenkunde

**Faculteit:** Faculteit Natuur- en Sterrenkunde

**ECTS-punten:** 7.5    **Categorie:**M    **Cursuscode:** NS-AP431M    **Periode:** 07-02-2005 t/m 15-07-2005  
(PER3-PER4)

**Toegangseisen:** .

**Veronderstelde voorkennis:** thermal physics, elementary electrodynamics, special relativity

**Voertaal** English

## Inhoud:

The course starts with an introduction into general relativity (geometry of Riemann surfaces, the field equations, the Schwarzschild metric, perihelium precession and deflection of light in the Schwarzschild metric, gravitational lenses). Next come compact objects (Tolman-Oppenheimer equations, mass limits, a simple neutron star model, black holes, the horizon concept). After a brief treatment of gravitational waves, the remainder of the course is devoted to cosmology (Robertson-Walker metric, the standard model of the hot Big Bang, synthesis of light elements, inflation, dark matter, vacuum energy, the Cosmic Microwave Background).

The course is largely theoretical in outline, but key observational facts are also treated.

Many practical exercises are treated to develop the ability of the student to solve elementary problems independently (e.g. how much do you weigh on the surface of a neutron star?). This ability is tested in the written examination.

**Cursusdoelen:** The course aims at providing the student with sufficient knowledge and skills in the field of the course to: - Participate in and obtain access to current research, - be able to formulate still open questions of the field and relate these to important concepts and phenomena discussed in the course, - solve problems in situations as treated in class, and in new situations.

**Contactpersoon:** prof. dr. R.J. Rutten

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**Inschrijven via OSIRIS Online mogelijk:** Ja

**Inschrijven voor bijvakkers mogelijk:** Ja

Werkvorm	Blok	Groep	Rooster		Gebouw	Zaal
Hoorcollege	PER3	1	10-02-2005 t/m 14-04-2005	Donderdag	09.00 - 11.00	MIN 211
	PER4	1	28-04-2005 t/m 30-06-2005	Donderdag	09.00 - 11.00	MIN 208
Werkcollege	PER3	1	07-02-2005 t/m 11-04-2005	Maandag	13.00 - 17.00	BBL 105B
	PER4	1	25-04-2005 t/m 27-06-2005	Maandag	13.00 - 17.00	BBL 105B

## Toelichting:

### Algemeen:

#### Hoorcollege

The students are expected to attend the classes and make the exercises during the tutorial classes.

### Vorbereiding bijeenkomsten:

Toets	Blok	Gelegenheid	Rooster	Gebouw	Zaal
Tentamen	PER4	1			
Tentamen	PERH	2			

## Toelichting:

### Beoordeling:

#### Tentamen

There will be a preliminary exam early during the course, and a final exam at the end.

## Aanbevolen materialen:

### Dictaat

Lecture notes and exercises will be made available on the internet in time. There is no compulsory literature.