

# Interacademiaal college sterrenkunde

**Faculteit:** Faculteit Natuur- en Sterrenkunde

**ECTS-punten:** 6      **Categorie:**M      **Cursuscode:** NS-AP428M      **Periode:** 07-02-2005 t/m 15-07-2005  
(PER3-PER4)

**Toegangseisen:** .

**Veronderstelde voorkennis:** classical mechanics, thermodynamics,<BR>ordinary and partial differential equations<BR>

**Voertaal** On request in English

**Inhoud:** Computational Astrophysics: Dynamics of Stars and Gas  
This course aims to give a solid basis in the computational aspects of astrophysics. There are many astrophysical topics where numerical calculations play an important role. However, rather than giving an overview, this course will concentrate in some depth on two topics: "practical hydrodynamics" and "practical N-body dynamics". Students will actually bring these topics into practice by working with simple but functional computer codes. The knowledge and experience built up in this course will be useful not only when applying them in future research projects, but also in learning to critically appraise results and conclusions based on numerical models.

The course consists of eight biweekly lectures (location: t.b.a.) alternating with practical work meetings in groups during the other weeks at the students' home institution, supervised by a local lecturer/ assistant. Subjects to be discussed during the lectures: (1) Astronomical objects for which hydrodynamics and N-body dynamics play a major role. (2) Basic physics, equations of motion. (3) Basic mathematics, properties of the equations. (4) Analytical solutions and numerical methods. (5) Programming methods. (6) Initial conditions and boundary conditions. (7) Practical applications, reliability of the techniques, solving known problems. (8) Harvesting results, comparing to astronomical observations. (9) Currently open research questions.

Lecturers:

Dr. V. Icke,

University of Leiden, email: icke@strw.LeidenUniv.nl, tel.: 071-5275843

Dr. S. Portegies Zwart,

University of Amsterdam, email: spz@science.uva.nl, tel.: 020-5257510

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

**Inschrijven via OSIRIS Online mogelijk:** Ja

**Inschrijven voor bijvakkers mogelijk:** Ja

Werkvorm	Blok	Groep	Rooster			Gebouw	Zaal
Hoorcollege	PER3	1	09-02-2005 t/m 06-04-2005	Woensdag	11.00 - 17.00	MIN	211
	PER4	1	27-04-2005 t/m 22-06-2005	Woensdag	11.00 - 17.00	MIN	211

**Toelichting:** **Algemeen:**  
Hoorcollege  
biweekly lecture

**Vorbereiding bijeenkomsten:**

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

**Toelichting:** **Beoordeling:**  
Tentamen  
Modes of Examination: Report about the practical work on an astronomical object or phenomenon, and a presentation at the home institution.

**Aanbevolen materialen:** **Boek**  
D. Heggie & P. Hut, The gravitational million-body problem (2002)  
**Boek**  
P. Hut & J. Makino, The art of computational science (2004)  
**Boek**  
R. Laney, Computational gas dynamics (2000)

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