

Astronomical Observing Techniques

Introduction to the Course

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Outline

1. Course Overview
2. People and Communication
3. Web Page
4. Books
5. Schedule
6. Exam and Grades

Course Goal

Know and be able to apply
the most common techniques that are
currently used
to observe and understand the
universe.

Relation to Other Courses

- BSc
 - Radiative Processes (Rossi)
- MSc in Astronomical Instrumentation (see <http://www.astroinstrumentation.nl>)
 - Astronomical Telescopes and Instruments
 - Astronomical Systems Design
 - Detection of Light
 - Astronomy from Space
 - Radio Astronomy
 - High-Contrast Imaging

Course Overview

1. Basics of Observational Astronomy:

- Properties of radiation (black body, radiometry)
- Atmospheric properties (transmission, emission, scattering, dispersion)
- Telescopes (reflector, refractor, mounts, foci, ground/space telescopes)

2. Theoretical Background/framework:

- Fourier transform (definition, properties, 1D/2D examples, theorems)
- Geometrical & diffraction optics (image formation, PSF, aberrations)
- Measurement properties (signal-to-noise, sensitivities, sampling)

3. Specific Techniques and Components:

- Radio Techniques (basics, antennae, receivers)
- Detectors (physical basis, photo-conductors, bolometers, heterodyne)
- Spectrometers (spectral information, dispersing elements, types)
- Adaptive Optics (principle, components, laser guide stars, types)
- Interferometry (speckle interferometry, visibility, types)

People

Christoph Keller

Professor of Experimental Astrophysics

Oort 569

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Stephanie Heikamp

PhD student with Bernhard Brandl, Christoph Keller

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Emiel Por

MSc student in Astronomical Instrumentation

Oort 101

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Communication

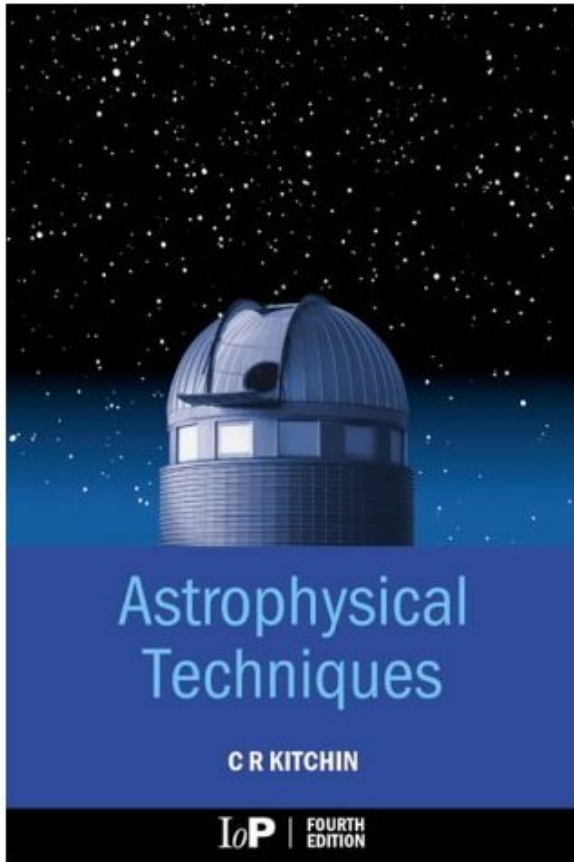
- **Emails to you:** via BlackBoard (sign up or miss important information)
- Non-UL students send email to Stephanie and Emiel with copy to me
- Lectures and all materials in English
- Questions, exercise answers etc. in Dutch or English

Course Web Page

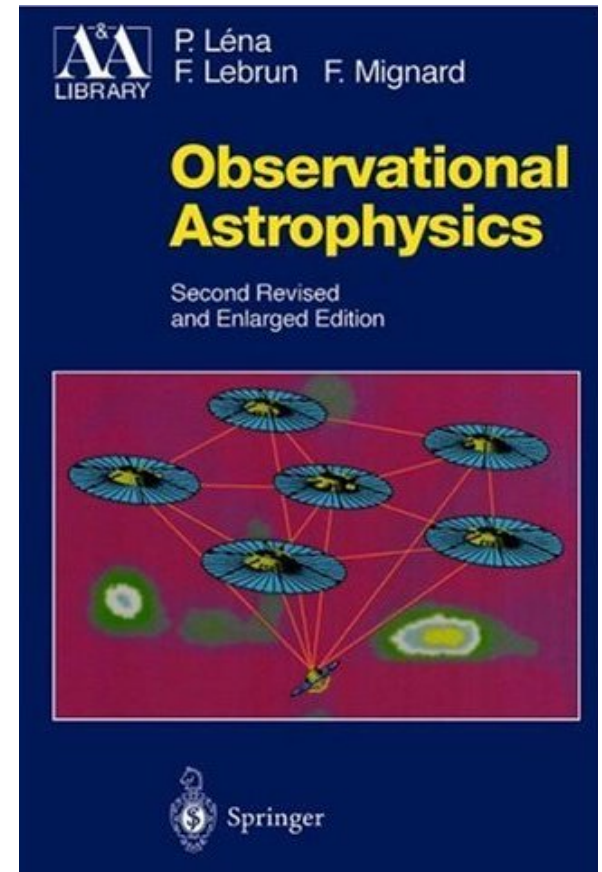
www.strw.leidenuniv.nl/~keller/Teaching/AOT_2014

- contact information
- course schedule
- lecture presentations, exercises, exercise materials (no exercise solutions)

Recommended (not required) Literature



Astrophysical Techniques, by C.R.Kitchin, 5th edition 2008, published by Institute of Physics Publishing, ISBN 978-1420082432



Observational Astrophysics, by Pierre Léna, 3rd edition, 2012, published by Springer, ISBN 978-3-642-21814-9

Schedule

Day	Time	Room	Type
Tuesday	09:00-10:45	HL 414	Lecture
Thursday	09:00-10:45	HL 414	Exercises

- Frequently check for changes on course web page!
- Coffee break or not?

Exercises

- Weekly exercises must be followed
- Apply and practice the newly acquired knowledge
- Improve your final grade by up to 1 point [if exercises are done well]
- If you skip the exercises, you are likely to fail the exam

Exam & Grading

- Written exam at the end (9 Jan. 2015) to test your knowledge and UNDERSTANDING of the subject matter
- Required knowledge: all lecture and exercise materials
- Open book (everything on paper is allowed; no laptops, tablets, smartphones etc.)
- Questions similar in style to exercises
- Mock exam towards the end of the course