

Astronomical Observing Techniques 2019

Introduction to the Course

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Learning Outcome

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

Foundation for MSc Courses

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

Course Overview

Foundations of Observational Astronomy:

- Electromagnetic radiation properties (black body, radiometry)
- Earth atmosphere properties (transmission, emission, dispersion)
- Fourier transform (definition, properties, 1D/2D examples, theorems)
- Geometrical and physical optics (image formation, PSF, aberrations)
- Measurement statistics (signal-to-noise, sensitivities, sampling)

Telescopes, Instruments and Observing Techniques:

- Telescopes (reflector, refractor, mounts, foci, ground/space telescopes)
- Radio Techniques (basics, antennae, receivers)
- Interferometry (speckle interferometry, visibility, types)
- Detectors (physical basis, photo-conductors, bolometers, heterodyne)
- Spectrometers (spectral information, dispersing elements, types)
- Adaptive Optics (principle, components, laser guide stars, types)

People



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Vanja Sarkovic

PhD student in LOFAR and Protoclusters of Galaxies
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Communication

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

Course Web Page

www.strw.leidenuniv.nl/~por/AOT2019

[AOT 2019](#)

[Literature](#)

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Astronomical Observing Techniques 2019

Welcome to the Bachelor course for Astronomical Observing Techniques (AOT)!

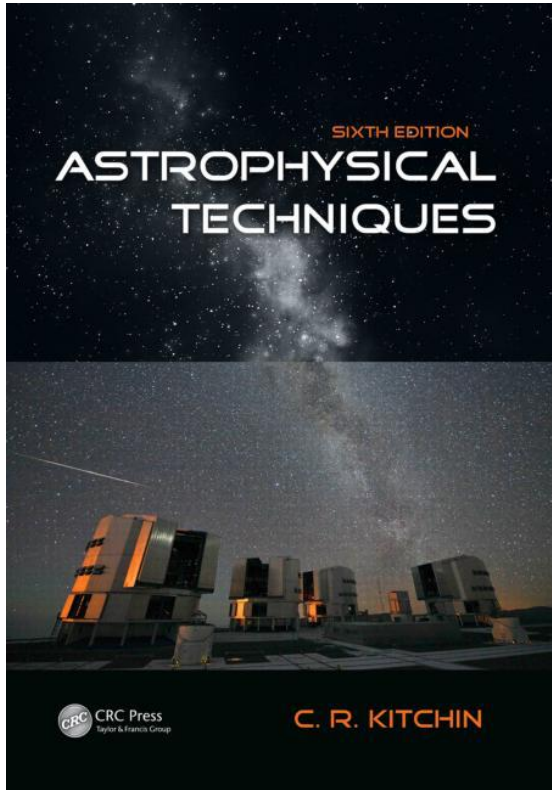
This course consists of a lecture series given by prof. dr. Huub Rottgering at Leiden Observatory in the Spring of 2019, accompanied by a series of exercise classes. This course will give students an introduction to the observational approaches and instruments of modern astronomy. The course is split into two parts:

- ▶ *The theoretical background.* This includes Fourier transforms, radiation, the Earth's atmosphere, and optics.
- ▶ *The observational techniques.* This includes optical and radio telescopes, detectors, spectrographs, and adaptive optics.

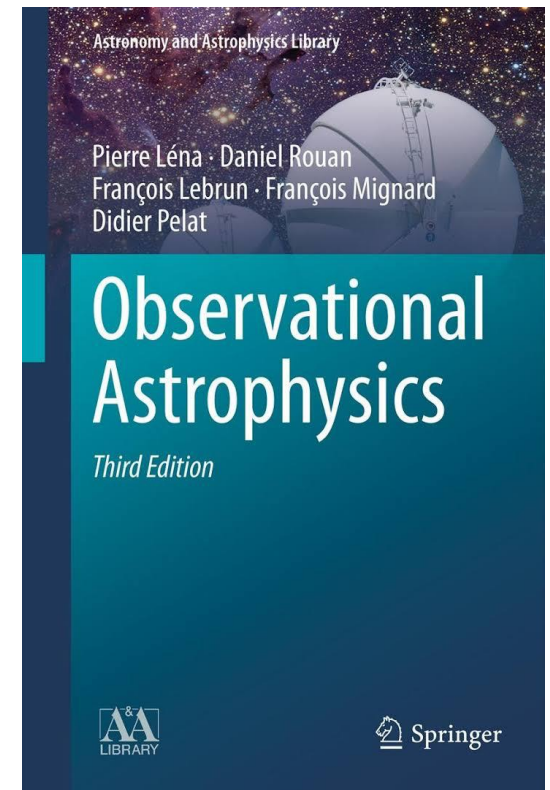
On this webpage you can find all necessary information about the course: recommended literature, course slides and exercises, and contact information for the lecturer and assistants. If there are any questions related to this website or this course, please email the assistants.

These pages will be updated throughout the course, so students are expected to stop by regularly.

Recommended (not required) Literature



Astrophysical Techniques, by C.R.Kitchin, 6th edition 2013, published by CRC Press
ISBN 9781466511156



Observational Astrophysics, by Pierre Lena et al., 3rd edition, 2012, published by Springer, ISBN 978-3-642-21814-9

Schedule

Day	Time	Room	Type
Monday	11:00-12:45	HL 204	Lecture
Tuesday	13:30-15:15	HL 106/109	Exercises

- Frequently check for changes on course web page!
- Coffee break: 11:45-12:00

Exercises

- Weekly exercises must be followed
- Apply and practice newly acquired knowledge
- Improve your final course grade by up to 1 point if exercises are done well
- If you skip the exercises, you are likely to fail the exam
- Experience of previous years
 - If home work grade average > 5.5 , ~90% pass rate
 - If home work grade average < 5.5 , ~70% fail rate

Exam & Grading

- Written exam:
 - 27 May 2018, 10:00-13:00, HL211/214
 - tests knowledge and UNDERSTANDING of subject
- Required knowledge: all lectures and exercises
- Open book
 - everything on paper is allowed, including slides
 - no laptops, tablets, smartphones etc.
- Questions similar in style to exercises
- Mock exam towards the end of the course
- Course grade = exam grade + homework bonus