Code: MKEP5	**Course title: Astronomical Techniques**
Type	Lecture with exercises
Language	English
Credit points	8
Workload	240 h
Contents	• Optical telescopes: optics and characteristic parameters, telescope types, diffraction, resolution, aberrations and corrections, applications • Optical detectors: detector types, semiconductors and CCDs, quantum efficiency, readout, noise sources, multi-chip cameras, applications • Imaging: techniques, photometry, data reduction and characterisation, signal-to-noise • Atmospheric effects and corrections: extinction, turbulence, seeing, active and adaptive optics, laser guide stars, applications • Spectroscopy: types of spectrographs and spectrometers, dispersive elements, integral field units, data reduction and characterisation, applications • Infrared astronomy: detectors and techniques, sources, applications • Radio astronomy: detectors and instrumentation, synthesis techniques, types of radiation and sources, applications • Astronomical interferometry: wavelength regimes, instrumentation, applications • X-ray and gamma-ray astronomy: detectors and instrumentation, types of radiation and sources, applications • Astroparticle physics: neutrino and Cherenkov detectors, sources and acceleration mechanisms of neutrinos and cosmic rays, applications • Gravitational-wave astronomy: detection, sources, applications. • In-situ exploration and remote sensing.
Objectives	After completing this course, the students have firm insight into the concepts, technologies, and the underlying physical principles and limitations of modern observational techniques along with scientific applications. They have knowledge of basic detector designs for different types of radiation and particles. They understand the environmental influence on astronomical observations. They are able to select and judge the adequate observational technique for studying an astronomical object of interest.
Module parts and teachings methods	• Lecture on “Astronomical Techniques” (4 hours/week) • Exercises with homework (2 hours / week)
Neccesary and useful knowledge	• prerequisites: knowledge of the introductory astronomy lectures (MVAstro0 or WPAstro); basic knowledge of electromagnetic radiation • recommended literature to be announced by the lecturer

Specialities	Credit points can be acquired either for MVAstro1 or for MKEP5, but not for both modules. The Laboratory Course Astrophysics is recommended as complementary to the MKEP5 module.
Usability	
Form of testing and examination	usually a 2-3 hours written examination
Term	Summer semester
Duration	1 semester