SOKENDAI CampusPlan Web Service

Syllabus Reference

Course title	Optical/Infrared Observation Instruments		
Term	後期 2nd Half		
Credit(s)	2		
The main day		The main period	
School/Program	School of Physical Sciences		
Department/Program	Department of Astronomical Science		
Category	Infrared Astronomy		
Lecturers	Hideki Takami		

Instructor

Full name
* TAKAMI HIDEKI

Outline	The lecture will focus on ground-based observations of the fundamental technologies and observational techniques of optical and infrared observational astronomy, from the principles of these techniques, including telescope engineering, imaging, spectroscopic observations, sensors, effect of the atmosphere, and adaptive optics technology.
Goal	・Acquire the basic knowledge necessary to conduct observational research in the field of optical and infrared astronomy. ・Acquire the basic knowledge necessary to conduct research and development of observational instruments. ・The course will also provide researchers outside the field of optical and infrared astronomy with the knowledge necessary to conduct observational astronomical research.

Grading system

	Grading system
Grading system	01:Four-grade evaluation (A,B,C,D)

Grading policy	Comprehensive evaluation based on attendance and reports on assignments
Lecture Plan	1st to 3rd (Basics/Overview) - History of optical and infrared astronomical observation technology (the invention of the telescope and the increase of the diameter have greatly changed our view of the universe) - Atmospheric Window - Fundamentals of optical and infrared observation: imaging observation techniques, spectroscopic observation, polarization observation, etc. 4th to 6th (Telescope) - Technology for large size telescopes: realization of large mirrors (honeycomb mirrors, thin mirrors with active optics), telescope structure - Improvement of reflectivity of mirrors: Coating technology - Seeing: What is Seeing, Seeing Improvement, Dome Seeing 7th to 10th (Instruments) - Imaging instruments (from single element to multi-element) - Optical sensors: From photographic plates to high sensitivity (CCD), high speed (CMOS), low noise - Infrared sensor: from single element to 2D element, large pixels, high speed. - Optical technologies essential for astronomy - Characteristics of imaging observations in astronomy - What determines the performance of observation - Recent advanced instruments - Spectrographs - Various spectroscopic techniques (gratings, prisms, Fourier spectroscopy, etc.) - Features of spectrometers in astronomy (higher efficiency, wider bandwidth, spectroscopy +

	imaging at the same time, etc.)
	  - What determines the performance of instruments
	  - Recent advanced instruments
	
	- Observation from space vs. observation from the ground
	
	11th to 14th (High-resolution observation)
	- Development of high-resolution observations in optical and infrared - observations, effect of atmospheric turbulence
	- What is Adaptive Optics
	- Observations from space vs. adaptive optics
	- Development of adaptive optical technologies
	- Optical interferometer
	
	15th (Summary)
	- Astronomical Observation Technology and its relationship with other fields

Location	Mitaka campus, NAOJ / online
Language	English (Japanese may be used depend on the member)
Textbooks and references	Not specified
Keyword	Observational astronomy, Optical and Infrared astronomy, Instruments, Adaptive Optics

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