

PINCIPAL COURSES

General astronomy

1. Objects and problems of astronomy
2. Principles of spherical, practical and positional astronomy
3. Motion and shape of the Earth,. Principles of Celestial mechanics
4. Main methods and instruments of astrophysics
5. The Sun and Solar System
6. Stars and Galaxy
7. The Metagalaxy. Principles of Cosmology

Spherical astronomy

1. Principles of spherical trigonometry. Spherical coordinates
2. Measurement of time. Daily rotation of celestial sphere
3. Refraction. Aberration of light
4. Parallax. Precession and nutation
5. Mean and apparent places of celestial bodies

Positional astronomy

1. Object and problems of positional astronomy. Practical astronomy
2. Determinations of coordinates of celestial bodies. Fundamental and inertial coordinate systems
3. Theory of Earth rotation. Motion of poles
4. Time and its measurement
5. Positional astronomy on the Moon. System of Astronomical Constants

Celestial mechanics

1. Gravitation fields of celestial bodies. Problem of many bodies
2. Problem of two bodies. General solution and classification of motions
3. Additional questions of Kepler's motion
4. Principles of perturbed motion theory. Stability of motion in celestial mechanics
5. Problem of three bodies
6. Principles of Solar System bodies motion theory.

General astrophysics

1. Subject and problems of astrophysics
2. Main astrophysical instruments. Telescopes.
3. Spectral devices. Principles of photometry
4. Radiation sensors
5. Methods of astrophysical research
6. Methods of determination of physical characteristics of celestial bodies
7. The Solar System. The Sun
8. Stellar atmospheres. Double stars
9. Internal structure of stars and non-stationary stars
10. Interstellar medium in Galaxy
11. Galaxy and Metagalaxy. Principles of cosmology

Theoretical astrophysics

1. Photospheres of stars. Models of stellar photospheres
2. Stellar atmospheres. Determination of chemical composition of stellar atmospheres
3. The Sun. Photosphere, chromosphere and corona of the Sun
4. Radioemission of the Sun
5. Gas nebulae
6. Non-stationary stars
7. Interstellar medium
8. Internal structure and evolution of stars

Stellar astronomy

1. Spatial characteristics of star distributions. Absolute magnitudes
2. Motion of stars. Stellar dynamics
3. Stellar statistics. Structure of the Galaxy
4. Extragalactic astronomy. Physics of galaxies

Principles of ecology

1. Problems of ecology and role of astronomy for their solving
2. Classes of natural objects and their spectral characteristics
3. Mathematical formalism of remote sensing
4. Remote sensing of Earth atmosphere
5. Radar and space methods and techniques of remote sensing of Earth

Methods of astronomical researches

1. Principles of Fourier - optics
2. Theory of diffraction-limited optical systems
3. Partial coherence
4. Principles of theory of turbulence
5. Radiation transfer in turbulent medium
6. Adaptive optics and speckle-interferometry

Theory of probability and mathematical statistics

1. Basic conceptions of theory of probability
2. Variates and their distribution functions
3. Random vectors and their distribution functions
4. Boundary theorems of theory of probability
5. General conceptions and problems of mathematical statistics
6. Random functions. Stationary random functions
7. Advanced methods of theory of random functions

Computer sciences

1. Computer viruses and protection from it
2. Using computers in scientific work and teaching
3. Electronic mail and Internet
4. Constructing effective calculation algorithms
5. Algorithms of image processing, local and integral algorithms

Computer sciences in astronomy

1. Computer planning of astronomical experiment
2. Computer planetariums and almanacs
3. Electronic stellar catalogues and atlases
4. Database obtained with space techniques
5. Formats of astronomical images
6. Electronic publications
7. Aperture photometry

Cosmology

1. Principles of general relativity
2. Relativistic cosmology of uniform and isotropic Universe
3. Physical evolution of Universe
4. Early Universe. Multiverses
5. Anthropic principle

History and methodology of astronomy

1. Science of science, its aim and problems
2. Place of Astronomy in system of scientific knowledge
3. Formation of scientific astronomy in frame of antique natural philosophy
4. Evolution of astronomy from antiquity to modern time
5. First revolution in astronomy. Differentiation of astronomical knowledge
6. Second revolution in astronomy. Methodological problems of modern astronomy
7. Astronomy and cosmonautic. SETI Problem
8. Near scientific forms of social consciousness. Astronomy and astrology

Methods and organization of scientific work

1. Main forms and stages of scientific works
2. Organization of observational Scientific Research Works (SRWs)
3. Organization of SRWs for processing and interpretation of observational data
4. Cooperative SRWs and international cooperation
5. Publications and application of results of SRWs. Financing of SRWs

Method of astronomical teaching in high school

1. History of development and structure of modern high education
2. Role and place of high astronomical education, its levels and forms
3. Preparation of professional astronomers
4. Preparation of specialists of high qualification
5. Methods of teaching of some fields of astronomy
6. Astronomy in secondary school and principles its teaching

Protection of labor in astronomy

1. Specific of protection of labor in astronomy
2. Observer safety during astronomical observations
3. Safety of work with high-voltage equipment, lasers and ionizing radiation
4. Safety of work with computer

5. Questions of safety in teaching process

ASTRONOMY SPECIAL COURSES

Physics of stars

1. Origin of stars and early stage of their evolution
2. Sources of stellar energy
3. Evolution of stars with different mass and close binary stars
4. Final stages of star evolution

Physics of planets

1. Gravitation fields of planets
2. Figures of planets, free and astronomical precession
3. Atmospheres and internal structure of terrestrial planets and giant planets
4. Principles of photometry and polarimetry of planets
5. Radar observations of planets

Chemistry and geology of planets

1. Chemical composition of Solar System
2. Principles of mineralogy and petrology
3. Geology of planets and satellites
4. Geology of Earth and Moon

Introduction to cosmonautics

1. Main stages of cosmonautics development
2. Physical and technical principles of cosmonautics
3. Perturbation motion of artificial satellites of planets
4. Interorbital and interplanetary flights

Structure and evolution of Galaxy

1. Classification, origin and structure of celestial bodies
2. Star clusters and associations
3. General composition and structure of Galaxy
4. Origin and evolution of Galaxy

New methods in positional astronomy

1. Radio astrometry, Radio interferometry
2. Position astronomy of artificial satellites of Earth
3. Space positional astronomy

Stars and substars evolution

1. Substars and extrasolar planets
2. Methods of detection of extrasolar planets and substars
3. Results of detection of extrasolar planets and substars

4. Internal structure and evolution of substars
5. Extrasolar planets and life in Universe

Infrared astronomy

1. Sensors of IR-radiation and their noises
2. IR-photometers
3. Terrestrial and space IR-telescopes
4. Results of celestial bodies researches in IR-range

Extragalactic astronomy

1. Statistical dependences between characteristics of galaxies
2. Dark matter problem
3. Diffuse matter in galaxies
4. Cosmic rays and magnetic fields of galaxies

Optics of planetary surfaces

1. Observational determination of planetary surfaces optical properties
2. Laboratory modeling of optical properties
3. Theoretical investigations of optical properties

Problems of modern astrophysics

1. Problems of continuum mechanics
2. Problems of planetary seismology
3. Turbulence and shockwaves on the Sun and interstellar medium
4. Problems of magnetic hydrodynamics in plasma
5. Wave processes in cosmic plasma
6. Problems of physics and astrophysics of high energies

SPECIAL PRACTICAL WORKS

1. Special practical works «Methods of mathematical statistics in astronomy»
2. Special practical works on theoretical astrophysics
3. Special practical works on stellar astronomy

TEACHING PRACTICES

1. Computing practice
2. Position astronomy practice
3. Astrophysics practice