
IOAA COURSE

SUMMER 2023

TEACHER:

IOAA Instructors

OFFICE HOURS:

By appointment

E-MAIL:

astronlinetraining@gmail.com

COURSE DESCRIPTION

This course is designed to go over all the topics included in the IOAA/IAO. It will have 16 sessions and each session is 90 minutes. Weekly assignments are provided and detailed feedback will be given a week after the due date. Three sessions out of 16 are only for problem solving and taking up the tests and homework issues.

Three Olympiad level practice tests will be taken during the course. A message board will be created for everyone taking the course and students will have the chance to make connections and discuss lesson and homework. The instructor will moderate the discussions and answer questions in the discussion board.

KEY LEARNING OUTCOMES

- Getting familiar with IOAA/IAO syllabus
- Learning how to think critically on olympiad problems
- Getting accepted into national astronomy olympiad teams

REQUIRED BACKGROUND AND PREREQUISITE KNOWLEDGE

This course is being offered in two levels: 1) *Basic* 2) *Advanced*

For the **Basic level**, There is no required background. If you are interested in Astronomy and want to apply for any Astronomical competition, this is more than enough motivation to take part in this course.

For the **Advanced level**, a solid background in high school Physics and calculus is required. Most of the homework and tests are going to be very similar to the actual IOAA problems.

We do not follow any specific textbook, so you do not need to buy any resources. The strength of this course is having a strong discussion group in discord, which will be frequently monitored by our instructors.

We also do have private/semi-private courses offered. Please reach out to our email to arrange a special class based on your individual needs. Private coaching is also included, we will be writing a full plan for your IOAA journey.

HOW MUCH DOES THE COURSE COST

The registration fee for the online camp is 900\$, though we will offer financial aid on a case by case basis; based on the country you reside. The registration can be done through PayPal payment. for more information contact us through email.

TENTATIVE COURSE CONTENT

Week	Topics & Homework
1	Celestial sphere: Spherical trigonometry, Celestial coordinates and their applications, Equinox and Solstice, Circumpolar stars, Constellations and Zodiac
2	Concept of time: Solar time, Sidereal time, Time zone, Universal Time, Local Mean Time, Different definitions of “year”, Equation of time
3	Solar System: Earth-Moon System, precession, nutation, libration, Structure and components of the Solar System, Structure and orbits of the Solar System objects, Sidereal and Synodic periods, Retrograde motion, Outer reaches of the solar system
4	Stars (1): Methods of Distance determination, Radiation, Luminosity and magnitude, Color indices and temperature, Determination of radii and masses, Stellar motion
5	Stars (2): Stellar formation, Hertzsprung-Russell diagram, Pre-Main Sequence, Main Sequence, Post-Main Sequence stars, supernovae, planetary nebulae, End states of stars
6	Problem Solving Session: Taking up all the homework and Q&A session.
7	Physics of Astrophysics: Basic Physics used in Astronomy and Astrophysics olympiads review
8	Celestial Mechanics (1): Investigating the orbit motion of celestial objects, conic section orbits, their velocities, energies, semi-major axis, period of rotation
9	Celestial Mechanics (2): Investigating the orbit motion of celestial objects, conic section orbits, their velocities, energies, semi-major axis, period of rotation
10	Binary systems: Visual Binary, eclipsing binary, spectroscopic binary, celestial mechanics of binary systems, mass transfer in binary systems
11	Problem Solving Session: Taking up all the homework and Q&A session.
12	Galactic & extragalactic astronomy: structure and composition, Rotation, Satellites of Milky Way, Classifications based on structure, composition and activity, Mass, luminosity and distance determination, Rotation curves
13	Observing the night sky: Navigation in sky, constellations, asterisms, telescopes, instrumentation
14	Telescopes & instrumentation: Telescopes and detectors (e.g. charge-coupled devices, photometers, spectrographs), Magnification, Focal length, Focal ratio, resolving and light-gathering powers of telescopes
15	Cosmology: Expanding Universe and Hubble’s Law, Cluster of galaxies, Dark matter, Dark energy, Gravitational lensing, Cosmic Microwave Background Radiation, Big Bang , Alternative models of the Universe, Large scale structure, Distance measurement at cosmological scale, cosmological redshift
16	Problem Solving Session: Taking up all the homework and Q&A session.