Dear Vivek,

Greetings from Univariety!

Happy to know that you have a keen interest in Astronomy.

Astronomy is basically a research oriented field, and is mostly sought by those minds which can stick on to on job & complete it no matter what happens. Its away from any glamour, politics, religion & offers more peace & prosperity. Astronomy essentially involves a combination of physics with mathematical calculations. An upcoming sub-field of astronomy is Astrophysics, which deals with the study of the physical nature of stars and other celestial bodies. The allied studies of Astronomy include - calculations of orbits, gravitational pulls, satellites, etc. and Cosmology which deals with the universe as an expanding holistic entity.

Astronomy is one of the oldest fields of science. It deals with the study of Universe and of the objects like sun, moon, stars, planets, comets, gas, galaxies, gas, dust and other non-earthy bodies. It is also a multidisciplinary subject that deals with the study of science with physics, chemistry, mathematics, computer science, geology and biology. Astronomy is necessarily an observational science rather than an experimental one. The discussions and interpretation of observations employ the use of mathematical analysis, often of the most advanced type

How to pursue?

 An aspiring student must study science at +2 level and then take up the B.Sc course with PCM (Physics, Chemistry, Mathematics) or join undergraduate courses in Astronomy & Astrophysics offered by selected universities and then on to post graduate studies from research Institutes.

**Aptitude requirements**

1. Good understanding of Science subjects – especially Physics & Mathematics.

2. A curious mind which searches for answers

3. Hardworking nature with concentrated & focused efforts.

4. Ability to work as a team player as well as an independent for long hours (including nights)

5. A bent of mind to explore new things, work against all odds & complete any given task.

6. Good programming skills using computers & calculations

7. Patience with lots perseverance.

As Astrophysics course in India is conducted mostly at the postgraduate stage. There is no university in India that offers an undergraduate programme in Astronomy. It will be advisable that you first get a degree in physics related courses like B.Sc in Physics and then pursue M.Sc in Astrophysics.

Astrophysics is a branch of astronomy that analyzes the properties and interactions of cosmological objects based on known physical law. Astrophysics can be broken down into observational and theoretical astrophysics. There is no such thing as experimental astrophysics because the scales and objects being observed are far too large or far away to experiment on with modern technology. Because light takes time to travel to us on Earth, the most distant regions of the universe are actually windows into the ancient universe, when the universe was far denser and more energetic. Because astrophysics sometimes deals with theories of the early, compact universe, it can overlap strongly with particle physics, which provides predictions of how matter would behave in the ancient universe.

Astronomy is the science which deals with the study of heavenly bodies. It considers

i) their motions, both real and apparent, and the laws which govern those motions;

ii) their forms, dimensions, masses, and surface features;

iii) their nature, constitution, and physical condition;

iv) the effects which they produce upon one another by their attractions and radiations;

v) their probable past history and future development.

Astrophysics/astronomy can be broadly divided into three branches - Theory, Observations and Instrumentation. For the first, you really need a strong hold on undergraduate physics. Knowledge in computational simulations would be icing on the cake.

Career Opportunities:

Astronomy is an amazing & a promising career for the students, those are interested in the mysteries of the universe.

A career in Astronomy is broadly divided as Theoretical or Observational though.

Theoretical Research career is typically involves doing Bachelors in Engineering or Technology or Masters in Physics with the basic knowledge in Mathematics & Physics. You can join Universities or Institutions for a Ph.D programme & obtain a permanent job.

Observation Research Career is wider because students have an engineering degree or have knowledge of computer systems & electronics are encouraged to apply for the graduation programme & allows doing an M.Sc by research prior to doing a Ph.D.

There are various job opportunities exists in public and private organizations like Bhabha Atomic Research Centre (BARC), Inter-University Centre for Astronomy and Astrophysics (IUCAA), NASA, Technology Information, Forecasting and Assessment Council (TIFAC) etc.

As a brilliant astronomer, you may be offered by space research centres like ISRO, NASA etc.

Interested people can also join teaching profession after the accomplishment of pre-requisite qualification.

As a beginner, you can work as a fellow researcher with the existing team who already working on an Astronomy project.

After completion of your degree in Astronomy, you can work as a research scientist with various research Institutions & big government organizations such as the Indian Space Research Organization (ISRO)

**Job roles:**

Astronaut

Research Scientist

Astronomer

University Faculty

**Salary Package:**

Salary in the field of astronomy depends upon the profession you have chosen. If you choose your career in teaching the salary may be different from the one who are working as a researcher.

The starting salary of an astronomer starts from Rs 50,000/- per month. Those who have earned experience and are highly qualified will earn an annual salary of Rs. 8 lacs to Rs 10 lacs.

**Top 10 Universities for Physics & Astronomy in USA:**

Massachusetts Institute of Technology (MIT)

Harvard University

Stanford University

University of California, Berkeley (UCB)

California Institute of Technology (Caltech)

Princeton University

Admission Procedure for USA:

You need to take SAT and IELTS or TOEFL, if you are planning to apply to any universities in US for any undergraduate degree, be it Business, Engineering, Art or Liberal Arts. If you are planning to go USA you need to give TOEFL with SAT and If you looking at multiple countries like US and UK we would suggest you to give IELTS with SAT because IELTS is acceptable in multiple countries

SAT:

The SAT is designed to gauge aspiring US undergraduates. The SAT I measures verbal and math reasoning abilities that you've developed throughout your school years. The multiple-choice test, developed by the not-for-profit Educational Testing Service, is intended to let students demonstrate their verbal and math abilities without regard to the kind of schooling they've had. According to the College Board, the test looks for a student's ability to understand and analyze written material, to draw inferences, to differentiate shades of meaning, to draw conclusions and solve math problems -- all skills that are necessary for success in college and the work world.

The International English Language Testing System (IELTS):

It assesses the English language proficiency of people who want to study or work where English is used as the language of communication. IELTS tests are held in over 900 locations across the world with tests up to four times a month .

Test Of English as a Foreign Language(TOEFL):

It is a test of an individual's ability to use and understand English in an academic setting. The test is designed and administered by Educational Testing Service (IELTS), and TOEFL is a registered trademark of ETS. It was developed to address the problem of ensuring English language proficiency for non-native speakers wishing to study at U.S. universities.

Please find the link below to learn more about the Test details:

https://www.univariety.com/test/SAT/e54cd5f9

https://www.univariety.com/test/SAT-II/7ab6a64f

https://www.univariety.com/test/Test-Of-English-as-a-Foreign-Language/4ca6cac8

 It has become an admission requirement for non-native English speakers at many English-speaking colleges and universities. Additionally, institutions such as government agencies, licensing bodies, businesses, or scholarship programs may require this test. TOEFL scores are valid for two years, after then they are no longer reported

So, if you at all plan to apply to universities in the US, one of the most important aspects that you have be prepared for is the SAT. Planning well in advance gives you a better opportunity to prepare well and therefore get admission in your desired universities.

 The admission process in USA is multi-faceted and competitive. They do not just emphasize on your academic performance, but also consider other criteria like SAT scores, quality of the applications and the reference letters, essays, specific test scores, past transcripts and finally an interview. Everything is measured in definite dimensions.

You also need to understand that applying to US would require you to understand the process of application and their requirements almost 18 months in advance, which means you have to be focused from the beginning of Grade 11.

Universities will offer a variety of application deadline types. Most universities offer one early deadline type (early action, restrictive early action or early decision) plus regular decision deadlines. However, always check the university's admissions page for full details.

Cheers!

Jenifer

Team Univariety