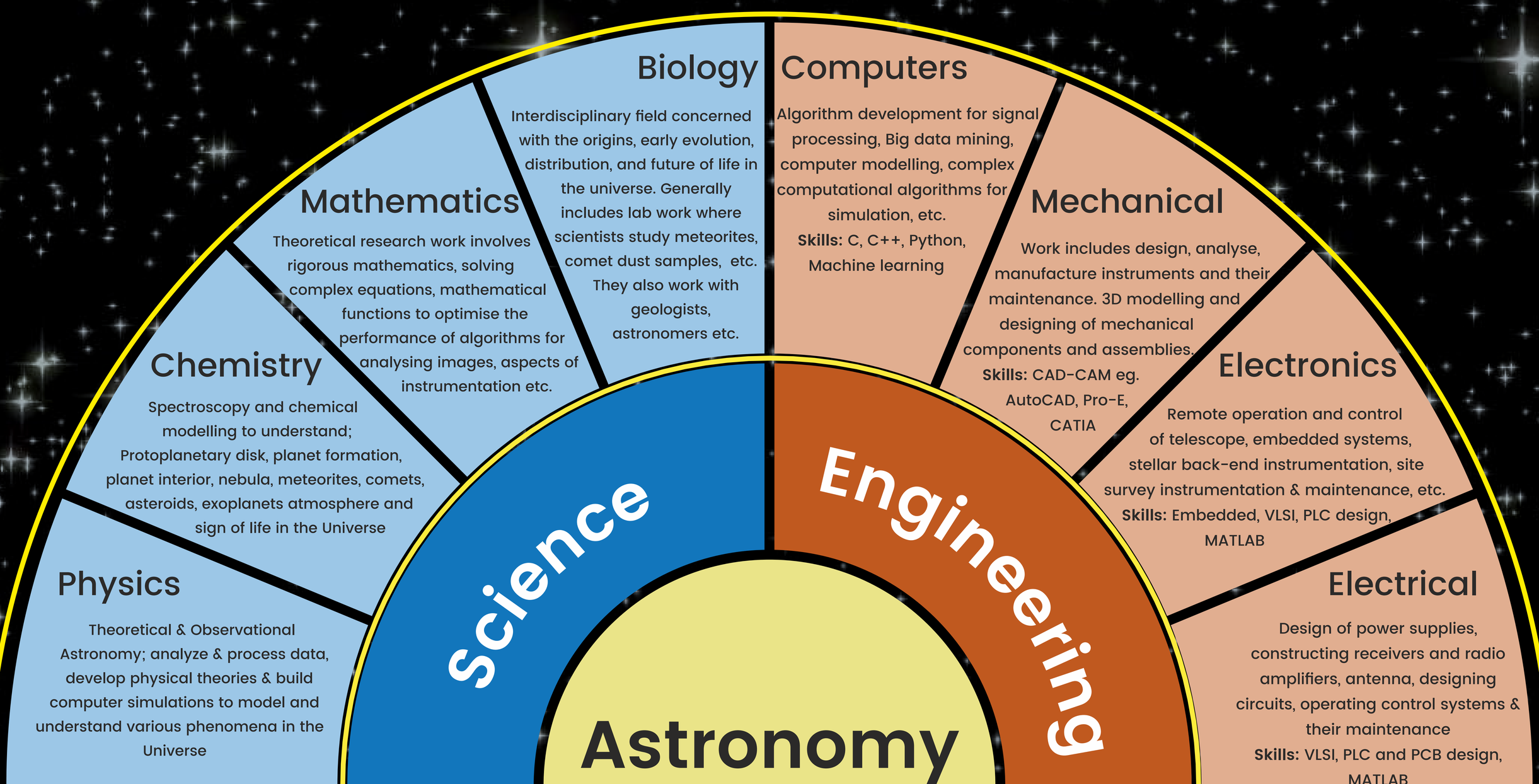
Careers in Astronomy



Theoretical & Observational Astronomy (Based on Object specialization)

- Gravitational Waves
- Galactic Astronomy
- Planetary Sciences
- Exoplanets
- Relativistic Astrophysics
- Extragalactic Astronomy
- Stellar Astronomy
- Plasma Astrophysics
- Solar Physics
- Interstellar Astrophysics
- Compact objects
- Astrometry

Astronomy Career Positions

- Project Student
- Project Assistant / Associate
- Project Scientist
- Scientific Trainee
- Scientific Officer
- Data Scientist
- Experimental Physicist
- Theoretical Physicist
- Software Developer
- Technical Officer
- Teaching Faculty
- Postdoctoral Fellow
- Astronomer
- System Engineer

e.g. A **Data Scientist** is a professional responsible for collecting, analyzing and interpreting large amounts of astronomical data to identify ways to help in research.

Outreach & Miscellaneous

- Educator
- Public Relation
- Technical Writer
- Engineering Technician
- Amateur Astronomer
- Designer
- Astrobiology (Inter - Disciplinary)

How do I get in?

In School (9th to 12th)

- Develop an understanding of the concepts and applications of Physics, Chemistry and Maths.
- Relate to these concepts by looking for them outside the classroom.
- Enjoy practical, hands-on activities along with your studies.
- Read popular literature about astronomy and astronomers.
- Join any active amateur astronomy group near you (e.g. Jyotirvidya Parisanstha, Pune).
- Participate in Olympiads, school level competitions organized by NASA, INTEL, FIRST etc.
- Prepare for scholarship programs such as KVPY, INSPIRE and Tata Education Grants.
- Prepare for merit-based(10th and 12th Grades) entrance for undergraduate admission at universities such as DU and exam-based admission in India through IIT-JEE, IAT, BITSAT, IIST etc. and outside India through SAT, ACT etc.
- There is no program in India to pursue an Astronomy specialization degree just after 12th.
- There are some dual/integrated degree BSc-MSc/B.Tech-M.Tech programs at Indian universities where students can enrol just after 12th.

Resources:

- NCERT and other reference books.
- Online resources: khanacademy.org, saylor.org, coursera.org, edx.org.
- Youtube channels: Pradeep Kshetrapal, Walter Lewin, ExamFear Education, 3Blue1Brown, Veritasium.
- arvindguptatoys.com for hands-on learning experience using science toys.

Exams and Competitions:

UG Entrance Exams:

- BITSAT: Birla Institute of Technology and Science Admission Test
- IAT: IISER Aptitude Test
- IIT-JEE: Indian Institute of Technology-Joint Entrance Exam
- SAT: Scholastic Aptitude Test (for foreign universities at UG level)
- PUBDET: Presidency University Bachelor Degree Entrance Test
- NEST: National Entrance Screening Test

Olympiads:

- IAO: International Astronomy Olympiad
- IChO: International Chemistry Olympiad
- IMO: International Mathematics Olympiad
- IPhO: International Physics Olympiad
- MTSE: Maharashtra Talent Search Examination (state level)
- NTSE: National Talent Search Examination

Scholarship/Fellowships:

- INSPIRE: Innovation in Science Pursuit for Inspired Research
- KVPY: Kishore Vaigyanik Protsahan Yojana
- Tata Education Grants

In College (UG & PG)

- Develop an understanding of the concepts and applications of the core subjects.
- Develop some skills such as computer coding (e.g. Python), software tools (e.g. SolidWorks) etc.
- Try in internships and Winter/Summer School such as VSRP, SRFP, SURP etc. from the first year of your UG program.
- Numerous foreign universities offer short-term, e.g. 1-week summer schools to students around the world. e.g. Introduction to Astronomical Instrumentation by Dunlap Institute of Astronomy & Astrophysics.
- Internships and summer programs are vital, and to learn valuable skills one should participate in them even if they are not directly related to Astronomy & Astrophysics.
- Pursue your final-year project at a research institute.
- Volunteer as a project student under the guidance of a researcher, or a teacher.
- Participate in various citizen science projects related to astronomy (e.g. planethunters.org).
- Prepare for PG level entrance exam such as JEST, GATE etc. for Indian Universities; GRE General, GRE Subject tests and TOEFL or IELTS(for testing English) for foreign universities.
- Campus France, uni-assist etc. are some of the agencies through which international students need to apply for most French and German universities.

Resources:

- Books recommended by university.
- Online Resources: NPTEL, MIT-OCW, UCI Open, Edx, Coursera, SWAYAM, Academic earth, 3Blue1Brown, Minute Physics.
- Blog for internships and programs outside India: 'How to make an Astrophysicist';
- Blog for internships in India: 'Internshala'.
- 'AstroBetter' is among very few blogs that provide worldwide information and resources related to Astronomy & Astrophysics.

Exams and Competitions:

PG Entrance Exams:

- GATE: Graduate Aptitude Test in Engineering
- GRE: Graduate Record Examinations (for foreign universities at PG level)
- INAT: IUCAA-NCRA Admission Test
- JAM: Joint Admission Test
- JEST: Joint Entrance Screening Test

Internships/Summer & Winter Schools:

- IISER-PSSP: IISER Pune Summer Student Program
- LEAPS: The Leiden/ESA Astrophysics Program for Summer Students
- SASP: Space Astronomy Summer Program
- SUPPR: Summer Undergraduate Program for Planetary Research
- SURF: Summer Undergraduate Research Fellowships
- SURP: Summer Undergraduate Research Program
- VSRP: Visiting Students' Research Programme

Note:

Working on real projects and problems in the field of Astronomy & Astrophysics (theory, instrumentation, analysis etc.) requires one to have a basic understanding of each aspect of the problem. Also, there is no hard and fast rule. For example, a person from a mechanical engineering background can perform the work of an electrical engineer, given the person has the required skills. Having the required skill set to execute the task in a project is what matters. One often needs to learn new skills and keep oneself updated according to the requirement of the problem.

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