The Centre for Space Science and Technology Education in Asia and the Pacific (Affiliated to the United Nations)

Announces

13th Post Graduate Course on Space and Atmospheric Science

(August 1, 2023 – April 30, 2024)

Conducted by

Physical Research Laboratory, Ahmedabad, India

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Embassy of Republic of Philippines,
50 N, Nyaya Marg, Chanakyapuri
New Delhi – 110 021

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Director, Kari Academy,
169-84 Gwahangno, Yuseong-Gu
Daejeon 305 806
Republic of Korea

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Director General & CEO,
Arthur C Clarke Centre for Modern Technology, Katubedda, Moratuwa,
Sri Lanka

Thailand

Dr Pakorn Apaphant
The Executive Director
Geo-Informatics and Space Technology Development Agency, Government Complex, Building B, 6 - 7th Floor, 120 Moo 3 Chaeng Wattana Road Lakshi, Bangkok 10210

Uzbekistan

Dr Kamol M. Muminov,
Ulugh Beg Astronomical Institute of the Uzbekistan Academy of Sciences,
33, Astronomicheskaya Str.,
Tashkent 100 052, Uzbekistan

UN-OOSA

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ADirector, UN Office for Outer Space Affairs,
Vienna International Centre,
PO Box 500, A-1400, Vienna, Austria

ITC, The Netherlands

Prof. Dr Freek van der Meer (Observer)
Rector, ITC
Faculty of Geo-information Science and Earth Observation of the University of Twente,
PO Box 217, 7500 AE Enschede,
The Netherlands

Secretary

Dr Prakash Chauhan
Director, CSSTEAP
Indian Institute of Remote Sensing Campus,
No. 4, Kalidas Road,
Dehradun - 248 001,
India

Governing Board Members and Special Invitees after the 27th G. B. Meeting

on December 14, 2022, at New Delhi

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INTRODUCTION

Space science and technology play a very important role in improving the quality of life on earth. The most noticeable impacts are in communication, television, telemedicine, satellite navigation, remote sensing data, weather forecasting, disaster mitigation through emergency mapping, etc. All countries, irrespective of rich or poor, have realised the importance of space technology for improving the living conditions of their citizens. Therefore, all countries should have access to space technology and must share equitable benefits. The global satellite data availability has made it possible for all countries to get benefits. However, a major precondition to successful space technology applications is the development of essential indigenous capabilities, particularly human resources. A consensus emerged within the international community that if effective assimilation and appropriate application of space technology are to succeed in developing countries, efforts must be made at different levels for capacity building in space technology.

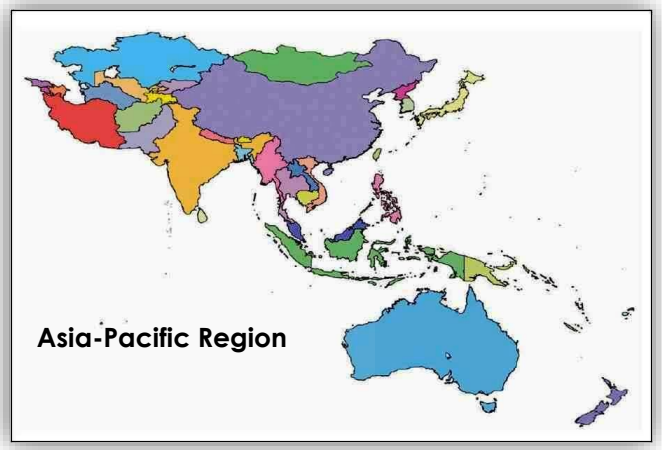
Under the auspices of the United Nations, through its Office for Outer Space Affairs (UN-OOSA), six regional centres for Space Science and Technology Education have been established in the following regions: Asia and the Pacific (India and China), Latin America and the Caribbean (Brazil and Mexico), Africa (Morocco and Nigeria) and Western Asia (Jordan). All these Centres are affiliated to the United Nations through UN-OOSA. These Centres use existing facilities and expertise available in education and other research institutions in their respective regions.

THE REGIONAL CENTRE FOR ASIA AND THE PACIFIC IN INDIA

The Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) was established in India in November 1995 with its headquarters in Dehradun and is the Centre of Excellence. The 1st campus of the centre was established in Dehradun, India at the Indian Institute of Remote Sensing (IIRS) which is a unit of the Indian Space Research Organization (ISRO), Government of India. For conducting its Remote Sensing (RS) &Geographic Information System (GIS) programs, the Centre has arrangements with IIRS as a host institution. The Centre has also arrangements with Space Applications Centre (SAC) Ahmedabad for

hosting programs related to Satellite Communications (SATCOM), Global Navigation Satellite System (GNSS), Satellite Meteorology and Global Climate (SATMET) and Physical Research Laboratory (PRL) Ahmedabad for Space and Atmospheric Science (SAS).

The Centre has been imparting education and training, helping participants in developing research skills through its programmes. This is achieved through rigorous theory, hands-on exercises, group discussions, field campaigns and pilot projects in the field of space science and technology. The programs aim at capacity building for participating countries in designing and implementing space-based research and application programs. The Centre also fosters continuing education to its alumni for advanced research leading to the PhD degree.



It should be emphasized that the overall mission of the centre is to assist participating countries in developing and enhancing the knowledge and skills of their citizens in relevant aspects of space science and technology so that such individuals can effectively contribute to national development programmes.

AFFILIATION TO THE UNITED NATIONS

The Centre has entered into a cooperative agreement with the United Nations which states that the United Nations will cooperate with the Centre by providing expert advice, educational curricula, technical support, necessary documentation and other appropriate support.

EDUCATIONAL PROGRAMMES AND COURSES

The educational program of the Centre is oriented towards the dissemination of knowledge in relevant aspects of space science and technology. The Centre aims to deliberate on education and research in the field of space science with an emphasis on theoretical studies and hands-on experience on state-of-the-art instrumentation, continuing education and awareness and appraisal programs. The curriculum has been developed under the auspices of the UN Office for Outer Space Affairs (UN-OOSA) and the guidelines emerged from the meetings held for Education Curriculum Development for the Centre at Granada, Spain in February/March 1995. These curricula are reviewed periodically by an International Advisory Committee. The activities of the Centre are guided by a Governing Board, Academic Advisory Committee and respective Board of Studies for each programme.

ACADEMIC ACTIVITIES

The academic activity is divided into two phases. Phase-I is of 9 months duration and executed at the Centre in India. After successful completion of Phase-I, the participants are encouraged to take up Phase-II research project of one-year duration in their home country. Phase-II allows participants to take up a research project relevant to their home country or organization and apply the technologies.
If desired by the candidate, then the candidate can submit the one-year research project to Andhra University, Visakhapatnam, India for a Master of Technology (M. Tech.) degree. The eligibility criteria of the university will apply.

(i) Post Graduate (P.G.) Programme: P.G. Courses of nine months duration are organized in the following disciplines:

- Remote Sensing and Geographic Information System (RS and GIS) (at IIRS, Dehradun)
- Satellite Communications (SATCOM) (at SAC, Ahmedabad)
- Global Navigation Satellite System (GNSS) (at SAC, Ahmedabad)
- Satellite Meteorology and Global Climate (SATMET) (at SAC, Ahmedabad)
- Space and Atmospheric Science (SAS) (at PRL, Ahmedabad)

Core Modules (Semesters I and II) emphasize the development and enrichment of the basic knowledge and skills of the participants in the field of space science and technology. This is followed by a pilot project, which provides an opportunity to fine-tune the skills for carrying out research in space science.

(ii) Master's Programme: This programme gives an opportunity and continuity in developing higher research skills for those who have completed successfully the nine-month P.G. Course. This is subject to qualifying for admission requirements of Andhra University, India. A research project by the scholars is conducted and executed in their respective countries with a view to transferring the technology to his/her organization. It will also be a test of the methodology and knowledge assimilated during phase-I at the centre.

COURSE RECOGNITION BY ANDHRA UNIVERSITY

The Centre is in agreement with Andhra University (est. 1926) Vishakhapatnam, India for awarding M. Tech. degree subject to the eligibility criteria of Andhra University. The terms and conditions of this agreement are reviewed from time to time.

A few meritorious students of the P.G. Course are also considered for the award of additional fellowship (six months to one year) to complete part of their research work at the Centre's host institutions in India which may lead to an M. Tech. degree from Andhra University. Research project work needs to be submitted to Andhra University within four years from the date of joining the PG course.

(iii) Short Courses: Besides P.G. level courses, the centre also conducts short-term courses of two to four weeks duration in specific themes of the above subjects regularly. For further details, you may please visit our website **www.cssteap.org**.

PROGRAMMES CONDUCTED

The Centre has so far conducted 25 Post Graduate Courses in Remote Sensing & Geographic Information System (RS & GIS), 12 each in Satellite Communications (SATCOM), Satellite Meteorology & Global Climate (SATMET), Space & Atmospheric Science (SAS) and 3 in Global Navigation Satellite Systems. The Centre has also conducted various short courses and workshops in the past 27 years. These programmes have benefitted more than 3200 participants from 38 countries in the Asia-pacific region and 24 countries from outside the Asia-Pacific region. Presently, the 26th RS&GIS PG Course at IIRS Dehradun, 13th Satellite Communications(SATCOM) and 4th Global Navigation Satellite Systems PG Course at SAC, Ahmedabad are in progress.

ANNOUNCEMENT OF THE 13TH P. G. COURSE

IN SPACE AND ATMOSPHERIC SCIENCE

Duration	**:**	**August 1, 2023 to April 30, 2024**
Venue	**:**	**Physical Research Laboratory, Navrangpura, Ahmedabad 380 009, INDIA**
Number of seats	**:**	**20 (Twenty)**

Last date for Receipt of Applications : April 30, 2023

Since the numbers of seats are limited, applicants are advised to process their applications well in advance of the last date to avoid inconvenience. Selected candidates will be intimated to initiate the action for joining the course.

WHO CAN APPLY?

The course is designed towards the scientists, teachers, professionals and specialists of the Asia Pacific region, working in the government, autonomous or university systems and educational institutes in the field of space science and allied fields, who wish to improve their skills in the field of Space and Atmospheric Science and thereby improve their usefulness to their parent Institutes/Organizations. It is strongly expected that the participating scholars will be able to:

- Serve as catalysts for furthering the skills and knowledge of other professionals in their countries.
- Enhance the self-reliance of their respective countries to lessen dependence on external experts.

HOW TO APPLY?

Applications are invited from candidates in countries of Asia and the Pacific Region for the 13th P. G. Course in Space and Atmospheric Sciences. All the candidates need to be either nominated or sponsored (i.e. endorsed) by recognized institutions (e.g. ministries, organizations, universities, etc.) in their respective countries. Nominating or Sponsoring institutions/authority should ensure that on return, the scholar will be given an opportunity to work in a development-oriented activity in the area of newly acquired knowledge and skills. After successful completion of the P. G. course, if the candidate wants to pursue research towards M. Tech. degree, it is assumed that the nominating/sponsoring authority will facilitate a one-year research project in the home country. However, the Centre will provide long-distance technical guidance. A limited number of short and long-term fellowships may be made available to meritorious participants to complete Phase II Research Project work in India.

Please fill up the **ONLINE APPLICATION FORM** available at the CSSTEAP website (**www.cssteap.org**). ***Offline applications will not be considered***.

Guidelines for filling online application form:

- The CSSTEAP website (**www.cssteap.org**) is best viewed in Firefox ver.70.x, Chrome ver.84.x, and Edge latest version.
- Open the admissions portal at **https://admissions.cssteap.org/login**
- Please register with a valid e-mail, after successful registration e-mail will be triggered at the given e-mail address to activate the account.
- To activate your registration log in with credentials with the activation link sent on your already registered e-mail.
- Note: In case the e-mail is not delivered on inbox, please check the spam folder.
- Before submitting the online application form, the applicants are requested to go through the course brochure carefully (eligibility and documents required etc.)
- Submit the online application form well in advance along with legible and scanned copies of all required documents. If the documents are in a language other than English, then a translation certificate should be uploaded.
- The documents should be uploaded in valid scanned .pdf format (with a file size limit between 25KB to 500KB).
- Recent scanned copies of passport-size photograph and Signature should be uploaded in jpeg, .jpg or .png format (with file size limit between 10KB to 100KB).
- The applicants are advised to fill in all their particulars carefully in the online application form.
- Important Note: The applicant is required to upload sponsoring/nominating agency certificate with an official seal, and/or the application should be forwarded by the Governing Board Member (GB) of CSSTEAP (please refer to the list at **www.cssteap.org/governing-board** if any GB Member of your country is in the list). Indian applicants need not send the application through GB members.
- For applicants from outside India, the completed form along with all the attachments is to be sent either to the Indian Mission/High Commission in the applicant's country

or through the Embassy/High Commission of the applicant's country in India for further processing. The Embassy/HC will forward the application to the Course Director via email (**uncsc@prl.res.in**).

- The applicants are advised to retain the printout of the finally submitted online application form.
- Please note that the online application form is not editable after the final submission.
- In case of any difficulties while submitting the online application form please e-mail at **websupport@iirs.gov.in**
- **The last date for submitting the online application form is April 30, 2023 @ 05:00 PM IST**.

Note:

The application should be completed in all respects and accompanied by attested and/or certified copies of all the certificates (School, Bachelor and Master, TOEFL, English Proficiency, etc.). Wherever these certificates are issued in a language other than English, the same may be translated into English and certified by the Head of the organization/department or provide English transcription of all such documents.

Since the medium of instruction is English, therefore, writing/ reading/speaking knowledge of English is mandatory. Nominating/ sponsoring agency may kindly note and ensure the above condition before forwarding the application. On arrival in India, if the candidate is unable to communicate in English, the candidate will be sent back to his/her country either at the cost of nominating agency or the candidate himself/ herself.

To know more about CSSTEAP, its past and future programmes, the list of participants and countries who have benefited from these and the Pilot Projects carried out through these programmes, please visit us at **www.cssteap.org**.

ELIGIBILITY FOR ADMISSION

The prospective participants should possess a Master's degree in Physics/Astronomy/Astro-Physics/Solar Physics/Meteorology or other equivalent qualification relevant to Space and Atmospheric Science, or Bachelor's degree in Engineering, (B.E./ B. Tech.) in Electronics and allied fields / Environmental Science/Engineering. Candidates having teaching or research experience would be preferred.

Important and Mandatory: The applicants are advised to bring original documents for verification at the time of reporting in India.

SELECTION PROCEDURE

The Centre will select the candidates through a well-laid procedure, which includes satisfying academic eligibility, proficiency in the English language, funding/forwarding by

sponsoring authority/organization, country representation, etc. Only selected candidates will be intimated by May 31, 2023. **Preference in selection will be given to those candidates whose expenses are borne by the candidate/sponsoring agency.** Once a candidate has been sponsored and admitted, the sponsoring authority/organization or candidate need to inform at least 15 days in advance for withdrawal or cancellation of the candidature. If the sponsoring authority wishes to call back its candidate after joining the Centre or in the middle of the course, the travel cost needs to be borne by either the sponsoring authority or the candidate. Nominating authority can change the candidate if so desired by them.

ABOUT HOST INSTITUTE

Physical Research Laboratory (PRL), founded in 1947 by Dr. Vikram A. Sarabhai, is known as the cradle of Space Sciences in India. It is a premier scientific institution under the Department of Space, Government of India. The research activities of PRL are truly multi-disciplinary at the cutting edge of science. These include Astronomy and Astrophysics, Space and Atmospheric Sciences, Solar Physics, Geosciences, Planetary Science, Atomic, Molecular & Optical Physics, Theoretical Physics & Cosmology. PRL has four campuses: the main campus at Navrangpura, Ahmedabad, with several world-class experimental and computing facilities; many leading laboratories in Thaltej campus, Ahmedabad; Optical and Infrared Observatory at Mount Abu, and Udaipur Solar Observatory at Udaipur. The research work done at PRL has been recognized by peers at both national and international levels. This is also reflected in international and national awards and honours received by PRL scientists over the years. The laboratory has a very strong human resource development component with doctoral (PhD), postdoctoral & visiting scientist programmes, a summer internship programme for B.Sc./M.Sc. students and college teachers, and project training for graduate and postgraduate students in science, engineering and computer applications.

PRL alumni have played a key role in building and contributing to the development of other institutions in the country. The Indian Space Research Organization (ISRO) was nucleated in PRL in the early seventies. For further details, you may visit the PRL website at **www.prl.res.in**

FACULTY

The faculty for the course constitutes experts in different fields drawn from the Physical Research Laboratory, Ahmedabad, a number of ISRO Centres and various research institutes and universities in India and abroad. The core faculty has a strong scientific background with a number of publications, the experience of participating in international scientific programs and organizing a number of courses/workshops/symposia, etc. to their credit.

MEDIUM OF INSTRUCTIONS

The medium of instruction/teaching is English. **Proficiency in written and spoken English is essential. Candidates who are not proficient in English are advised not to apply.** Applicants, who have done their higher studies in a medium (language) other than English, are required to submit a TOEFL score or a diploma/certificate of English language issued by an accredited language institution for satisfactory establishment of the applicant's competence in spoken and written the English language.

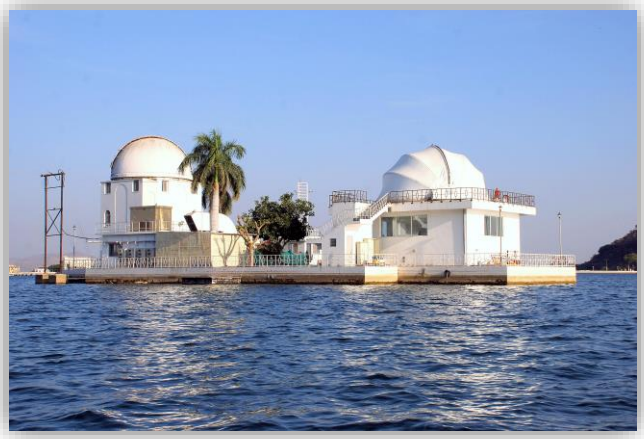
TEACHING METHODS AND FACILITIES

Modern facilities exist at the Centre for classroom teaching and practical instructions/demonstrations. Printed as well as digital course material of the lectures is supplied. The teaching methods include classroom lectures, video lectures, computer-based training packages, laboratory experiments, group discussions, demonstrations, and seminar presentations.

Physical Research Laboratory, Ahmedabad is a premier institution of space research in India. A number of sophisticated experiments like digital ionosonde, high power LIDAR, optical instruments for photometry, spectrophotometry and imaging of day/night airglow emissions, instruments for surface/in-situ measurements of ozone, aerosols, trace gases, conductivity, electric fields in the middle atmosphere and of electron density, ion-neutral composition and electric fields in the ionosphere, form the backbone of the current space research activities. Computer facilities include a number of high-power workstations with a large number of PCs connected through network with connectivity to the Internet. PRL hosts an excellent library with a large collection of books and periodicals in varied fields of Space and Atmospheric Sciences.

For astronomy and Solar Observations, two dedicated Observatories, one operating in infrared and the other in visual bands are there at Mount Abu and Udaipur, respectively. An

ambitious research plan for the next five years has been drawn up and space-based experiments in Astronomy, Atmospheric and Planetary Sciences are proposed.



PERFORMANCE EVALUATION

The performance of the participants is assessed through written, interactive sessions and/or computer-assisted practical exercises. Independent assessments of theory exams are conducted by external and internal faculty. However, the practical examination is conducted jointly. The participants need to pass each examination paper.

AWARD OF DIPLOMA/DEGREE

On successful completion of the Phase-I study, i.e. 9-month course, the participants will be awarded Post Graduate Diploma. A certificate of Attendance will be given to the candidates who fail to clear the examinations. If the participant is able to complete Phase-II Project work (i.e. one-year research project in home country), satisfactorily within four years of joining the PG course, the work can be submitted to the Andhra University (India) for the award of M. Tech. degree.

COURSE EXPENSES

The overall expenses of the course are given below. This does not include international travel (to and from the city of the course participant to the course venue):

Course Fee:	US $ 6000 per participant
Local tour expenses:	US $ 750 per participant (Approx.)
Living expenses:	US $ 2000 per participant (Approx.)

The participants are expected to find suitable sponsorships or funding for meeting the expenses while attending the course in India. Preference will be given to such candidates.

FINANCIAL ASSISTANCE FROM THE GOVERNMENT OF INDIA

To encourage the participants from the Asia-Pacific region, selected participants will be waived off the course fee and local tours. Furthermore, financial assistance will be provided to a few of the selected candidates as mentioned below:

Living expenses in India:	INR 31,000 per month for 9 months
Book allowance:	INR 2,000 (one time)
Project allowance:	INR 1,500 (one time)
Local tour expenses:	INR 50,000 (as per actuals)

The Centre receives some financial assistance for international travel for a limited number of participants of the Asia-Pacific region through agencies like the UN Office for Outer Space Affairs (UN-OOSA) and the UN Economic and Social Commission for Asia and the Pacific (UN-ESCAP). **Candidates seeking financial assistance and international travel assistance have to specifically request for the same in the Application Form.**

INSURANCE

Medical, life and disability insurance should be undertaken before reaching India, by the participants themselves or on their behalf, by their sponsoring institute/organisation for covering entire health and disability risks. No medical expenses will be borne by the Centre. However, participants who receive the Fellowship of the GOI will be paid medical expenses for minor ailments on actual basis (as outpatients only) as and when such expenses are incurred after recommendation by an authorised medical doctor of the Physical Research Laboratory. The centre will have only limited liabilities as far as medical expenses are concerned in such cases. Candidates must clearly specify if they are suffering from any health disorders which may affect their study programmes. Candidates in sound physical and mental health only need to apply. Participants, who are not covered by appropriate Medical insurance while in India, would be required to take a Medical Insurance policy in India by themselves. If any medical information requiring attention is kept hidden and found out during the course, the centre will be compelled to send the candidate back home and all expenses towards the same will be borne by the candidate/sponsoring organisation.

SCIENTIFIC AND SIGHTSEEING TOURS

As part of the programme, the students are taken on scientific tours to selected national centres of excellence in Space and Atmospheric Science. They also take part in festivals and visit historical site

LIFE AT CENTRE

The participants will stay in an international hostel on a single occupancy basis with independent kitchenette. The campus is equipped with good living facilities like gymnasium, tennis court, etc. A sum of Rs. 3600/- per month is to be paid by each participant towards accommodation charges. Boarding and other expenses such as cooking gas are to be borne by the participants. Spouse/no other person will be allowed to stay along with the candidate in the hostel during the entire tenure of the course. Staying in the hostel is compulsory for all the participants and staying outside is strictly not allowed.

The international hostel will provide an opportunity for the participants to interact and share their knowledge and cultural values. India is a country of festivals. So, the participants will also get to know about different colourful festivals throughout the year. The 9-day dance festival of Garba (October-November), followed 20 days later by the light and cracker festival of Diwali, the kite festival of Makara-Sankranti (January) and the colour festival of Holi (March) are occasions to enjoy.

ABOUT THE CITY

Ahmedabad is named after Sultan Ahmed Shah who founded this city in 1411 AD and graced it with splendid monuments. It is a great textile and commercial centre and was called the 'Manchester of India' in the past. Ahmedabad is today a prosperous, thriving city, the second-largest in western India. The city is associated with Mahatma Gandhi, the apostle of peace and non-violence whose Ashram or retreat, on the banks of the river Sabarmati is now a place of national pilgrimage.

Ahmedabad's long and prosperous historical past has given it a rich architectural legacy. The earlier monuments of the city date back to the pre-Mughal Muslim Sultans of Gujarat who founded the city and embellished it with mosques and mausoleums in mellow, honey-coloured sandstone to create what is now known as the Indo-Saracenic style of architecture - a rare and happy blend of Muslim and Hindu styles.

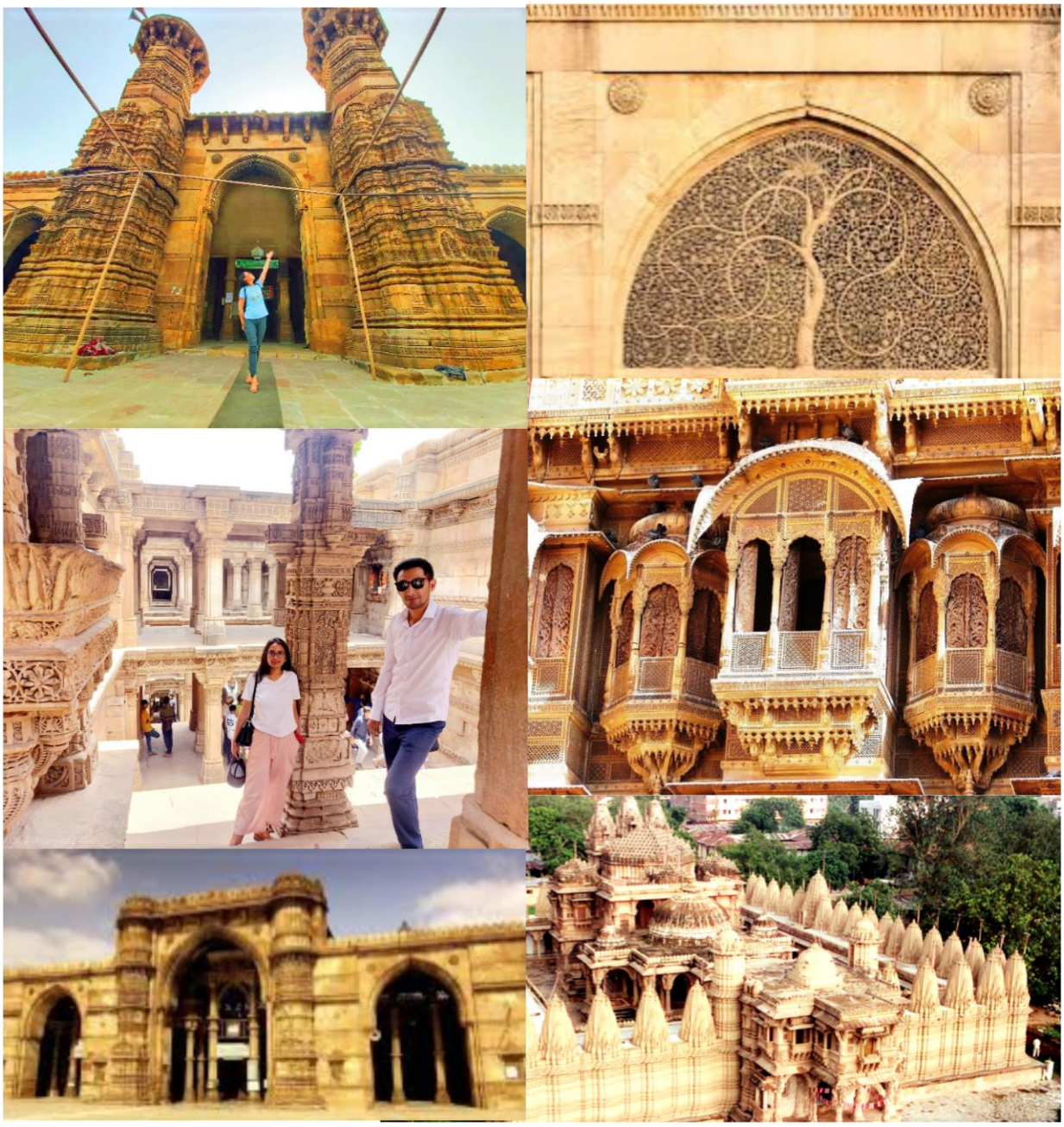
With growing wealth and affluence, the textile magnates of Ahmedabad added new architectural marvels to their city. The ancient skills of temple building were revived with the construction of Jain temples in and around the city, superbly carved, sculptured and ornamented in pure white marble. And thanks to their progressive and sophisticated patronage, Ahmedabad acquired some of the most striking and excitingly contemporary architecture in India. Many of Ahmedabad's new buildings bear the signature of such world-celebrated architects as Le Corbusier and Louis Kahn and India's Doshi and Correa.

It is also the home of many premier academic and cultural institutions, mainly due to the vision of Vikram A. Sarabhai, who was the founder of PRL. Prominent among them are Ahmedabad Textile Industries Research Association, National Institute of Design, Indian Institute of Management, Institute of Indology, Vikram Sarabhai Community Science Centre and Darpana Academy of Performing Arts apart from PRL and Space Applications Centre (SAC). The city is well connected by rail, road and air with all major cities in India. There are daily air services from Delhi, Mumbai, Chennai, Kolkata and Bengaluru. PRL is situated about 8 km from the railway station and about 15 km from the airport.

Life in Ahmedabad reflects the variety and continuity of its traditions. The crowded bazaars and chowks of the old city are awash with the ebb and flow of people buying and selling Gujarat's traditional handicrafts, hand-painted and block-printed cloths, brass utensils, woollen rugs and shawls, wooden chests and silver jewellery.

Summer months from April to June are very hot. Rainfall in the area is moderate, The weather is pleasant from November to March.

In July 2017, the Historic City of Ahmedabad or Old Ahmedabad was declared as India's first UNESCO World Heritage City.



SPACE AND ATMOSPHERIC SCIENCE COURSE AT A GLANCE

The course consists of two phases. Phase-I is of 9 months duration. Successful completion of this phase leads to the award of a Post-Graduate (PG) diploma by the Centre whereas Phase-II is a one-year research project for a Master of Technology (M.Tech.) degree from Andhra University (AU), Visakhapatnam, India.

PHASE-I: NINE-MONTH PG DIPLOMA COURSE

The Space and Atmospheric Science (SAS) Post-Graduate Diploma course of 9 months duration is spread over two semesters. There are 5 theory papers and 10 related laboratory experiments in the first semester, while 4 theory papers and 10 experiments are to be completed in the second semester. Introductory lectures on topics covering all the branches of space science and technology are delivered in the beginning of the course for about one or two weeks. The course ends with a pilot research project of two months. A brief description of the course content is as follows:

Theory:

Semester 1:

Paper 1: The Sun and Space Weather (5 credits, 50 hrs)

Topics covered: The Sun and Solar wind - Processes (The Sun, Observing the Sun, Solar processes and Atmosphere, Solar activity, Flares and eruptive Processes, Sun-Earth connection), The Magnetosphere and the impact of the Sun (Geomagnetic field, Solar wind and formation of the magnetosphere, Phenomena in Magnetosphere, Space weather and Space climate).

Paper 2: Near-Earth Space and its Ground-based diagnostics (6 credits, 60 hrs)

Topics covered: Earth's Ionosphere (Structure and Variability of Earth's Ionosphere, Ionospheric Plasma Dynamics, Electromagnetic Wave Propagation in Ionosphere), Tools for investigating Near-Earth space (Radio Antennae, Radio sounding, Optical Techniques, Airglow).

Paper 3: Earth's Atmosphere, Weather and Climate (4 credits, 40 hrs)

Topics covered: Structure and Dynamics of Earth's atmosphere, Weather and Climate, Numerical simulation of atmospheric processes and species, In-situ measurements and remote sensing of atmospheric parameters.

Paper 4: Planetary Science (3 credits, 30)

Topics covered: Solar System Planets, their Satellites, and other Minor Bodies, Atmospheres of Planets and Satellites, Planetary Ionospheres, Magnetospheres and Solar wind interaction, Studies of Planets and Satellites in the Laboratory.

Semester 2:

Paper 5: Astronomy and Astrophysics (4 credits, 40 hrs)

Topics covered: Introduction to Astronomy, Introduction to Astrophysics and Astrophysical Processes, Astrophysical Phenomenology, Astronomical data archives and data processing.

Paper 6: Space Instrumentation (2 credits, 20 hrs)

Topics covered: Overview of Space Systems/sub-systems, In Situ and Remote Sensing Techniques.

Paper 7: Space Exploration (4 credits, 40 hrs)

Topics covered: Space Missions, Astronomical Instruments and Observing Techniques

Paper 8: Data Analysis Techniques (2 credits, 20 hrs)

Topics covered: Data Quality and Error Analysis, Methods of Data Analysis, Analysis of Large Data.

Practical: (*4 Credits in each semester*)

In addition to theory classes, participants spend considerable time in carrying out various practicals involving laboratory work. In these, they conduct various experiments under the supervision of experts at the host institution.

The students perform 10 Practicals in each Semester.

The suggested list of Practicals is given below:

Semester I: *Measurement Techniques for Near-Earth Environment*

1. Remote sensing of total ozone, water vapour and aerosol optical depth
2. In-situ measurements of physical, chemical and optical properties of Aerosols
3. Surface Monitoring of trace gases
4. Cloud dynamics using Ceilometer
5. Atmospheric Investigations using Rayleigh/Mie/Raman Lidar
6. Airglow Studies (Photometry/Spectrometry/Imaging)
7. Ionospheric Sounding using an Ionosonde/Digisonde
8. Effect of solar X-ray flare on Ionosphere
9. Study of Ionospheric Scintillations
10. Total Electron Content measurements using GPS receiver
11. Study of Equatorial Ionization Anomaly
12. Study of Acoustic Detectors

Semester II: *Measurement Techniques for Solar and Stellar Astronomy*

1. Characterization of X-ray detector
2. Measurement of geo-magnetic field
3. Measurement of the Sun's photospheric temperature
4. Study of solar rotation
5. Determination of Heliographic Coordinates
6. Sunspot area and number
7. Solar magnetic field
8. Light Curve of Variable Star
9. Radio Pulsar Studies using GMRT/OSRT
10. Polarization & directivity of Radio Antenna
11. Radiation properties of Radio Antenna
12. Plotting HR diagram of star clusters and finding their distances.
13. Finding abundance in the stellar atmosphere of a few elements using the curve of growth.
14. Finding the plate scale for a telescope.
15. Measurement of asteroid size by stellar occultation

Seminar: *(2 Credits in each semester)*

Besides theory and experiments, short presentations (10 minutes each) are made by students on any of the topics covered in the syllabus.

PILOT PROJECT: *(2 months, 4 Credits)*

Each student will carry out research work on his/her topic of interest under the guidance of a research faculty using observation/data analysis/modelling/simulation. During this two-month period, the student will be guided by an Indian supervisor and get a) guidance on the line of action to be pursued at home, b) all the necessary experimental data if required and c) the necessary software tools, etc.

If the student is eligible and wants to pursue M. Tech. under Andhra University, he/she will have to carry out a one-year research project at home for which the pilot project will initiate the foundation.

PHASE II: ONE-YEAR PROJECT

The students who successfully finish their PG course and are interested in continuing for a Master of Technology (M.Tech.) degree, the Centre offers the opportunity to do so, in collaboration with Andhra University (AU) in Visakhapatnam, India. To this end, the student will have to carry out an approved project in his/her home country for one year. This is to

be formulated jointly by the scholar and his/her advisor at the Centre during Semester II of Phase I in an area relevant to the interest of the sponsoring institution/ country. The sponsoring institution/country is obliged to guarantee that the student, on return, would remain in a suitable position with commensurate and progressive remuneration and other entitlements for a minimum period of 3 years and will be provided with all facilities to carry out the work. This course programme will be considered complete on acceptance/ approval of the submitted project report.

ABOUT ANDHRA UNIVERSITY

Andhra University was established in 1926. It is a premier institute of higher learning and it became a trendsetter in higher education and university administration. It is accredited with an 'A' Grade by the National Assessment and Accreditation Council of India and has ISO 9001:2008 certification for its quality standards. The University is strong in all faculties and was headed by great personalities like Sir C.R. Reddy, Dr. Sarvepalli Radhakrishnan and others as Vice-chancellors.

Andhra University is considered to be one of the 14 best Universities in India in terms of Research by the Department of Science and Technology, Govt. of India. Andhra University also offers PhD programmes in various specialisations of contemporary interests by all the departments.

MPORTANT

Last date for Receipt of Applications : April 30, 2023

Information of Selection : May 31, 2023

Commencement of Course : August 1, 2023

Completion of Phase-I (in India) : April 30, 2024

For any further query, contact us at the following address:

Prof. J. Banerji

The Course Director

Space and Atmospheric Science

Room # 762

Physical Research Laboratory,

Navrangpura, Ahmedabad 380 009, INDIA

Telephone # +91-79-2631-4762
Fax # +91-79-2631-4900
Email uncsc@prl.res.in

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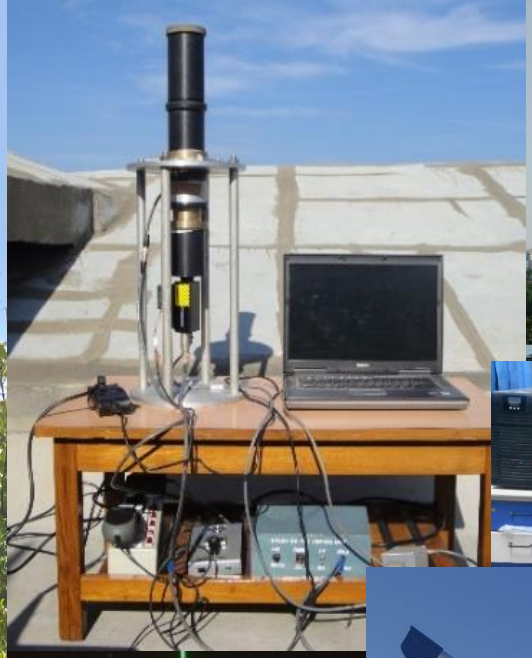





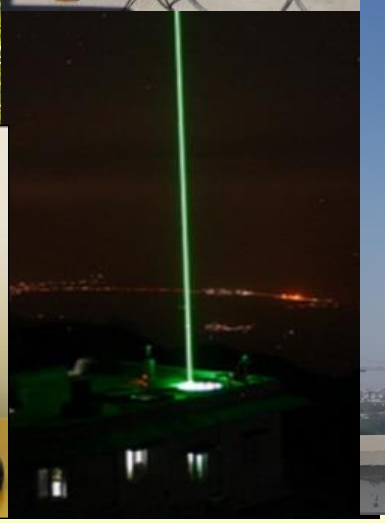

Host Institute:
Physical Research Laboratory,
Ahmedabad 380 009, India
Website: www.prl.res.in
Email: uncsc@prl.res.in

CSSTEAP HQ:
IIRS Campus, 4, Kalidas Road,
Dehradun 248 001, India
Website: www.cssteap.org
Email: cssteap@iirs.gov.in