



Knowledge for Sustainable Development  
(Deemed to be University under Section 3 of the UGC Act, 1956)  
Accredited by NAAC

**2021-22**

[www.terisas.ac.in](http://www.terisas.ac.in)



# TERI SCHOOL OF ADVANCED STUDIES PLACEMENT BROCHURE

**M.Sc. (PLANT BIOTECHNOLOGY)**



**DR. SHAILESH NAYAK**  
Chancellor, TERI SAS

## MESSAGE FROM THE CHANCELLOR

Established as an institution of higher learning, TERI School of Advanced Studies aims at creating knowledge and human capacity that enables transition towards a more sustainable world.

The foundation of the institute was laid by TERI (The Energy and Resources Institute) - a not-for-profit, independent research organization globally known for its contribution to scientific and policy research in the realm of energy, environment and sustainable development.

As a leader in sustainability education in India and abroad, TERI School of Advanced Studies (TERI SAS) has been transforming students into sustainability professionals who bring sustainable solutions to the problems that hinder growth in rapidly developing countries like ours.

With the help of an interdisciplinary curriculum taught by a multi-disciplinary faculty, the institute imparts world-class education in domains such as climate change, energy, environment, urban development, policy, water resources,

biotechnology, geoinformatics and sustainability management among others.

The niche programmes offered by the institute cater to the demands of the industry and are subjected to constant amendments which enable our students to face and resolve issues with ease.

The feedback from the academic peers, employers and other stakeholders always motivate us to work towards improving our teaching methodology and curriculum.

Whether it's the organizations of global relevance such as the United Nations or the organizations that work to bring change at the grass-root level, our alumni are contributing in every aspect of life across continents to make earth more sustainable for future generations.

Therefore, I welcome you all to hire our students who are competent leaders and will be great assets to organisations.



## PROF. PRATEEK SHARMA

Vice Chancellor, TERI SAS

# MESSAGE FROM THE VICE CHANCELLOR

Dear Development and Industry Partners,

**T**he TERI School of Advanced Studies (TERI SAS) is an academic institution of higher learning that was conceived to create a cadre of trained professionals imbued with critical thinking who would be able to provide innovative solutions to the problems in their respective disciplines. The focus of all the academic programmes is on research-led inclusive teaching. It lays special emphasis on imparting the students with a set values that make them responsible and socially accountable. The curriculum of the various academic programmes have a unique blend of theory and practice that ensures that the students inculcate and imbibe the problem-solving attitude through regular engagement with research projects, industry exposure and field visits. The attempt is to provide students with the necessary industry / organization exposure, as well as give them a chance to hone their skills. The academic programmes facilitate systematic amalgamation of wide spread knowledge under a common platform, which in turn fosters learning through the inter-disciplinary approach.

India is one of the world's fastest growing economies and has increased its size by almost six times in the last two decades. While on its growth trajectory, country is committed towards the Sustainable Development Agenda 2030. Knowledge is and has been the main driver for the economic growth. Thus, the higher education institutes have to play a key role in creating knowledge through research and training a

committed set of corps who would be able provide solutions to the challenges faced by the society in its developmental path. Being one of the pioneers of sustainability education in India, TERI SAS has emerged one of the most prestigious and unique institutions in the country that aspires to contribute globally by serving society as a Centre of Advanced Studies. It trains students in niche areas such as environmental studies, business sustainability, biotechnology, renewable energy, sustainable cities, water resources and climate change. Moreover, all the programmes are mapped with various sustainable development goals (SDGs).

Our alumni who hold coveted positions at institutions of repute including corporates, government organisations, research institutes, NGOs and international organizations have been the ambassadors of our vision of creating knowledge for sustainable development in both public and private sectors.

The graduates who pass out through the portals of this institute will essentially be instilled with values and thoroughly professional in their approach towards work. The academic rigour through which the students go through makes them well-versed with contemporary developments in their domains and infuses in them an attitude that gives them confidence to succeed and face various challenges with poise.



# ABOUT THE TERI SAS

TERI SAS (earlier TERI University) was established to disseminate the vast reservoir of knowledge devised by The Energy and Resources Institute (TERI), a not-for-profit, independent research institute recognized globally for its contribution to scientific and policy research in the realms of energy, environment, and sustainable development.

In 1999, the University was granted the 'Deemed to be University' status by the University Grants Commission (UGC) and notified vide the Ministry of Human Resources Development, Department of Education, Government of India, notification no. F.9/19/95-U-3, dated October 5, 1999. TERI SAS is also accredited by National Assessment and Accreditation Council (NAAC).

TERI SAS' academic programmes are envisioned to provide students with a holistic perspective of the subjects offered and encourage interdisciplinary learning. The University aspires to be an institution of advanced learning which meets the needs of a rapidly growing nation. The University uses modern pedagogical tools, richly supplemented by field visits, live industry projects, and hands-on applications.





# ADMINISTRATION

The Board of Management (BOM) is the final decision-making body in respect to all the academic, administrative, personnel, financial and developmental matters of the Deemed to be University.

The Academic Council (AC) executes and exercises general supervision of overall academic work of the Deemed to be University along with giving directions regarding methods of instruction, evaluation and improvements in academic standards.

# BOARD OF MANAGEMENT

## Chairman

### Prof. Prateek Sharma

Professor & Vice Chancellor (Acting), TERI SAS

## Deans

### Prof. Ramakrishnan Sitaraman

Professor & Dean (Academic), TERI SAS

### Prof. Shaleen Singhal

Professor & Dean  
(Research & Partnerships), TERI SAS

## Three Eminent Academicians Nominated by Chancellor

### Dr. Eswaran Somanathan

Professor, Economics and Planning Unit,  
Indian Statistical Institute

### Prof. George John

Ex Vice Chancellor  
Birsā Agricultural University, Ranchi and  
Former Sr. Advisor, DBT, Govt. of India

### Dr. Sachin Chaturvedi

Director General  
Research and Information System for  
Developing Countries (RIS)

## Nominee of Sponsoring Society

### Mr. R. R. Rashmi

Distinguished Fellow & Programme Director, TERI

### Dr. Nimmi Singh

CGM (Chem.) – ONGC Energy Centre

### Prof. Bhim Singh

Dean (Academic) & CEA Chair Professor,  
Indian Institute of Technology, Delhi

### Dr. V. P. Singh

Regional Representative for South Asia,  
International Centre for Tropical Agriculture

## Two Teachers (Prof. and Associate Prof.)

### Prof. Anandita Singh

Professor, TERI SAS

### Dr. Naqui Anwer

Associate Professor, TERI SAS

## Secretary

### Mr. Kamal Sharma

Registrar (Officiating), TERI SAS



# THE ACADEMIC COUNCIL

<b>Chairperson</b>	<b>Prof. Prateek Sharma</b> Professor & Vice Chancellor (Acting) TERI SAS	<b>Nominee of Vice Chancellor</b>	<b>Dr. Vivek Suneja</b> Professor of Strategy, Faculty of Management Studies (FMS), University of Delhi
<b>Deans</b>	<b>Prof. Ramakrishnan Sitaraman</b> Professor & Dean (Academic)  <b>Prof. Shaleen Singhal</b> Professor & Dean (Research & Partnerships)  <b>Prof. Anandita Singh</b> Professor & Dean (Students' Welfare)		<b>Dr. T.C. Kandpal</b> Professor, Centre for Energy Studies, Indian Institute of Technology Delhi  <b>Prof. Arun S. Kharat</b> School of Life Sciences & Former Director Internal Quality Assurance Cell (IQAC), Jawaharlal Nehru University, New Delhi
<b>Heads of The Departments</b>	<b>Dr. Sudipta Chatterjee</b> <b>Prof. Vinay Shankar Prasad Sinha</b> <b>Dr. Sukanya Das</b> <b>Dr. Sapan Thapar</b>	<b>Co-opted Members</b>	<b>Mr. Manoj Chugh</b> President – Group Public Affairs & Member of the Group Executive Board Mahindra & Mahindra Ltd.  <b>Mr. Rajesh Ayapilla</b> Director-CSR and Sustainability for India and South-West Asia, The Coca Cola Company  <b>Mr. Rahul Mittal</b> Director, International Tractors Ltd.
<b>Professors</b>	<b>Prof. Ramakrishnan Sitaraman</b> <b>Prof. Nandan Nawn</b>		
<b>Two Associate Professors From Departments</b>	<b>Dr. Chander Kumar Singh</b> <b>Dr. Naqui Anwer</b>		
<b>Two Assistant Professors From The Department By Rotation of Seniority</b>	<b>Dr. Montu Bose</b> <b>Dr. Anu Rani Sharma</b>	<b>Controller of Exams</b>	<b>Dr. Seema Sangita</b>
		<b>Secretary</b>	<b>Mr. Kamal Sharma</b> Registrar (Officiating), TERI SAS





# ACADEMICS

Since its inception, the wide array of academic programmes offered by TERI SAS have been related to sustainable development and structured around four thematic areas—biotechnology, regulatory and policy aspects, energy and environment, and natural resources.

The University is a first-of-its-kind in India to dedicate itself to the study of environment, energy, law, water resources, business sustainability and natural sciences for sustainable development.



## Department of Natural and Applied Sciences

Quality of life depends on the quality and quantity of natural resources available for use to human race. The world today faces an unprecedented challenge of sustainability. Finding a balance between meeting the needs of human population and maintaining integrity of nature around us is the foremost question of our times. It is imperative to understand how natural processes and systems work around us and how to best use them in pursuit of this balance. The Department of Natural and Applied Sciences (DNAS) at TERI SAS is established to impart training for engaging with the questions of natural resource management in a scientifically rigorous manner. It houses faculty members from a diverse disciplinary academic background with a focus on applied research for informed decision making.

DNAS offers four distinct interdisciplinary masters programs in Biotechnology, Climate Science and Policy, Environmental Science and Resource Management, and Geoinformatics; and two transdisciplinary Ph.D. Programs in Bioresources and Biotechnology, and Natural Resource Management.

Students pursuing their Master's / Doctoral programme at DNAS are exposed to an academically rigorous and interdisciplinary learning environment with a significant emphasis on laboratory work and engagement with contemporary debates, emphasizing exploration and creative thinking and application as essential ingredients of originality in research and learning.

## Department of Biotechnology

The Department of Biotechnology at TERI SAS offers both master's and doctoral programmes. The Department is committed to the furtherance of scientific enterprise through establishment of a vigorous research programme and to contribute to postgraduate-level academic programmes to cater to national requirements in basic science as well as agricultural and environmental applications. The first M.Sc. programme in Plant Biotechnology by the Department was initiated in 2008 with funding from the Department of Biotechnology, Government of India which was restructured in 2021 in form of an M.Sc. Programme in Biotechnology with two specialisations, namely, Plant Biotechnology and Microbial Biotechnology. Students opting for master's or doctoral programme can expect an academically rigorous

and interdisciplinary environment and significant emphasis on laboratory work, emphasizing original, creative thinking, and research.

Doctoral students may also choose to carry out their research in the laboratories of our parent organization TERI ([www.teriin.org](http://www.teriin.org)), in fields as varied as microbial biotechnology, mycorrhizal technology, environmental bioremediation, plant tissue culture, and biofuels, to name a few.

## Department of Policy and Management Studies

The primary challenge of the modern human race is to improve well-being across generations, an objective now widely recognized as Sustainable Development. This challenge necessitates numerous interventions concerning each of its components: environmental, social and economic. These interventions range from eradication of hunger and poverty to reduction in inequality; from the provision of quality education, good health, decent work environment, water, sanitation, affordable and clean energy to fostering gender equality; from economic growth to effective institutions; from responsible consumption and production to taking urgent actions to combat climate change.

The Department of Policy and Management Studies (DoPMS) at TERI SAS aims to contribute to theoretical and empirical enquiry towards informed prescriptions, implementable policies, sustainable practices and management through research, teaching and training. The continued research in sustainability for the business is also one of the key concerns of the Department.

Faculty of the Department have disciplinary backgrounds in Anthropology, Economics, Population Studies, Sociology, Finance & Accounting, Corporate and Commercial Laws, Public Health, Strategy, Business Sustainability, Circular Economy Finance, Climate Finance, Development Studies and Public Policy. This diversity enables the promotion of multi-disciplinary research and learning at the economy-society-ecology interface. The faculties are engaged in active research in their disciplines as well as within the broad theme of sustainable development. This is reflected in their publications, sponsored projects, consultancies and training programmes and supervised research. The faculty regularly engage with the scientific community through seminars and conferences, participate in different forums as experts or resource persons, and engage with the general public through their lectures, print and digital media.

## Department of Sustainable Engineering

Over the past half century, the global community has been debating the mode of economic growth, amid challenges of environmental degradation, energy transition and climate change. India among the several emerging economies, though at crossroads, has chosen a trajectory of sustainable development for ensuring inter-generational equity and inclusiveness in its growth journey. As India is growing economically amid an increased pace of urbanization, the burden on resource utilization and management is also increasing. Two prominent sectors facing significant challenges are energy and urban development, which are bound to increase due to climate change. Addressing these challenges will require trained professionals who can assess the problems, think critically by integrating multiple sectors and create evidence-based solutions. The focus of Department of Sustainable Engineering (DSE) at the TERI SAS is to develop a cadre of professionals having requisite knowledge and skillsets towards addressing the current and envisaged challenges faced by humanity by promoting scientific, technological and policy innovations for strengthening local, regional, and global development agendas.

DSE offers MTech and doctoral programmes in areas of Renewable Energy Engineering & Management (REEM), and Urban Development Management (UDM). The Department is cognizant of the complex environmental, socio-economic, and political challenges that require an integrative approach towards engineering and sustainability. The DSE encourages collaboration with relevant stakeholders including industry, government, academic & research institutions, and multi-lateral organizations to deliver practice-informed research and teaching.

The curriculum of programmes offered by DSE is an eclectic mix of foundational and advanced courses which promotes both critical and creative thinking. The students at DSE are drawn from diverse branches of engineering, science,

architecture, and planning which cultivates robust peer learning. The faculty at the DSE has wide experience and expertise across multiple domains, touching upon the two main themes of the Department – renewable energy and urban development.

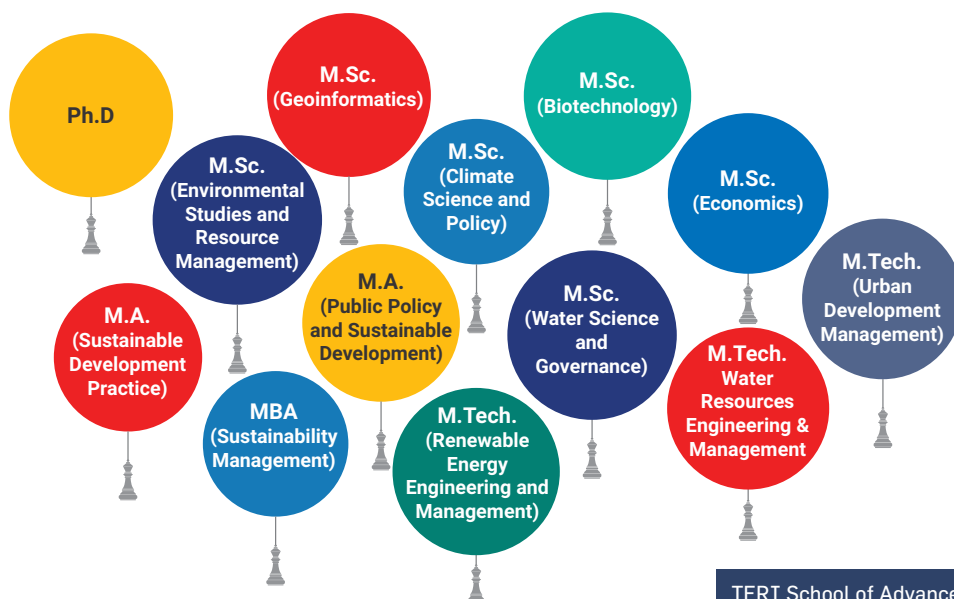
## Coca-Cola Department of Regional Water Studies

The mission of the department is to create a cadre of water professional who can provide systematic solutions to enhance water security. Recognizing the need to go beyond the dominant engineering focus while training students, the water science and governance programme aims to prepare regional water champions who can address water problems in a holistic manner. The courses offered in the programme are job oriented, need-based, and are designed to include all aspects related to water and its governance. The programme is designed to have a healthy blend of theory and practice. The teaching programme focuses on cross cutting issues of water resources through science, engineering, legal, socio-economic and institutional dimensions.

The department offers two Masters level programmes and PhD programme. The M.Sc. programme in Water Science and Governance is an interdisciplinary program with special emphasis on development of social, economic, institutional and governance perspectives. The objective of the programme is to create water professionals equipped to examine water issues in a trans-boundary and cross-cultural framework transcending environmental science, social, economic and legal discourses. The M. Tech programme in Water Resources Engineering and Management integrates engineering and technological theories with socio-economic principles. The courses address the technical, social, economic, legal and political, dimensions of water. Interdisciplinary in its scope and objectives, the programme prepares students for a rewarding and challenging career in water resources management.

# PROGRAMMES OFFERED

At present, the following programmes are offered at TERI SAS:



# COLLABORATIONS

Stressing the importance of the international perspective in its programmes, TERI SAS has collaborations with several international universities aimed at facilitating a mutually beneficial exchange of students, faculty, knowledge, resources, and ideas.

## Organisations with which TERI SAS has collaborations are:

- Albert Ludwig University of Freiburg, Faculty of Forest and Environmental Sciences
- AUBURN University
- Central Pollution Control Board (CPCB)
- Centre of Excellence in Thermal Energy Storage
- Chulalongkorn University and United Nations Environment Programme
- Coca Cola India (P) Ltd.
- Columbia University
- CPCB
- Dalmia Cement Bharat Ltd. & Others
- Department of Atomic Energy (BRNS)
- Department of Science and Technology (DST)
- Development and Ganga Rejuvenation
- East Delhi Municipal Corporation
- Embassy of Kazakhstan
- Embassy of Sweden
- Freie University of Berlin, Germany
- Global Challenge Foundation
- Government of Arunachal Pradesh
- Gurugram Municipal Corporation
- Guwahati Smart City Limited
- HUDCO
- ICEWARM
- Indian Council of Social Science Research (ICSSR)
- Indian Institute of Technology (IIT), New Delhi
- International Centre for Integrated Mountain Development (ICIMOD)
- International Development (USAID)
- Jamshedpur Notified Area Committee (JNAC)
- Karvy Management Pvt. Ltd.
- Keio University
- United Nations University
- Ministry of Climate and Environment, Norwegian Ministry of Earth Sciences
- Ministry of Human Resource Development (MHRD)
- Ministry of Petroleum and Natural Gas
- Ministry of Water Resources, River Development and Ganga Rejuvenation
- Monsanto, DBT, Sisco Research Lab., STM Journals
- Municipal Corporation Chandigarh
- National Mission on Himalayan Studies (NMHS)
- National Security Council Secretariat (NSCS)
- Nirmal Seeds Private Limited
- North Delhi Municipal Corporation
- Nuclear Law Association
- One Climate Club
- Pune Smart City Development Corporation Limited
- Pune Smart City SPV
- RMIT University
- Science & Engineering Research Board (SERB)
- SIDA
- Solidaridad Network Asia Limited
- Sygenta Foundation for Sustainable Agriculture
- Technische Universiteit
- TERI
- TERI School of Advanced Studies in collaboration with India Health Organization, Apollo Tyres, Greenlight Planet and DRDO
- The Indira Gandhi National Centre for the Arts (IGNCA), New Delhi
- The National Institute of Urban Affairs (NIUA)
- The Trustee's of Coloumbia University
- The United Nations Environment Programme (UNEP)
- The United States Agency for International Development
- Think Tank Initiative (IDRC)
- Toyota Kirloskar Motor Pvt. Ltd.
- Tribhuvan University
- Udaipur Smart City Ltd. (Municipal Corporation of Udaipur)
- UNDESA (DSD)
- UNEP
- University of Graz, Austria
- University of Reims Champagne – Ardenne, France
- University of Surrey and Royal Society of Chemistry
- UNU IAS
- USAID
- Uttarakhand State Council for Science and Technology
- WaterEd Australia Pty Ltd.



# INFRASTRUCTURE

TERI SAS provides the best equipment and instruments, which includes state-of-the art computer hardware and software, well-equipped laboratories, video-conferencing facilities and access to South Asia's most comprehensive library on energy and environment.

# GREEN CAMPUS

Spread over two acres, TERI SAS' Green campus comprises of an administrative block, an office block, a convergence and a hostel block. The green campus provides a setting that enhances learning while simultaneously showcasing the concept of modern green buildings including insulation of external walls, terrace insulation, Hunter Douglas louvers, solar water heating system, waste water recycling, rainwater harvesting, solar rooftop system, LED lights and Windmill.

TERI SAS campus is one of the world's best Green Campuses with Solar Rooftop System, Water Management, Rain Water Harvesting, Waste Management, Natural Ventilation, Cooling system which includes Earth Air Tunnel (EAT) System, Thermal Mass Storage System, Variable Refrigerant Volume (VRV) System, Thermal Storage, Pedestrian-friendly Pathways and finally the Natural Lighting.

# LABORATORIES

**TERI SAS laboratories are equipped with advanced equipment and facilities to aid and stimulate research. The different laboratories at TERI SAS are:**

## Environmental Monitoring Laboratory

The laboratory has been created with an objective of providing a facility with all the basic equipment's required for analysis of environmental samples (soil, waste, water and air). It caters to the interdisciplinary application in research to all the master's students (science based). This laboratory facility is common for M.Sc./M.Tech (ESRM, CSP, WSG) programs.



## Combustion Lab

The combustion lab has been established in 2009 with the initial funding received from DST and MNRE projects. It is a small lab however equipped with instruments used for emission and thermal efficiency testing. Primarily, we conduct experiments based on internationally accepted protocols viz, Water Boiling Test (WBT) and Kitchen Performance Test (KPT) in the above-mentioned lab. The hood methodology is used to capture and quantify the various products of incomplete combustion.



## Environment Lab

The laboratory supports master's level experiment pertinent to the laid curriculum. The lab is equipped with instruments required for the environmental analysis (soil, water, and air). The laboratory is capable of performing analysis on drinking water, wastewater, surface and ground water, sediments, including air quality monitoring, and basic microbial analysis. Laboratory also supports various training programs offered by university in the associated fields. This laboratory facility is common for M.Sc. (ES, WSG and CSP) programs.

## Centre of Excellence in Thermal Energy Storage

The laboratory is equipped for research on new thermal storage system development for subambient, low and medium temperature application and characterizing storage material properties for optimal system design.

## Heat Transfer Laboratory

The laboratory provides hands-on training to students to understand various heat transfer modes, devices and to quantify their characteristics parameters or properties.





### Power Systems Laboratory

The lab provides fundamental experimental knowledge on different equipment used in electrical power system at various loading conditions and to measure their characteristics.

### Hybrid Micro Grid (HMG) Laboratory

The lab is a research facility used for carrying out power flow experiments.

### Energy Simulation Laboratory

The lab is equipped with the current software used in Renewable Energy industry. The lab provides in-depth understanding on design, simulation, financial analysis and optimization of various renewable energy technologies for plant/system design and other applications.

### Biofuel and Waste Utilization Laboratory

The lab is used to conduct research experiments on combustion process, fuel properties, biomass conversion and pyrolysis.

### Solar Energy Laboratory

The lab is equipped with outdoor and indoor experimental facilities to conduct experiments on characterization of solar photovoltaics modules, radiation measurement and performance analysis of various solar thermal devices/systems.



### Geoinformatics Laboratory

The TERI SAS geoinformatics laboratory is well equipped with state-of-the-art equipment such as workstations, a scanner, printer, plotter, navigation devices, infrared thermometers, etc. It has licenses to high-end commercial software like ERDAS Imagine, LPS, ArcGIS, MIKE, GMS, and WEAP along with other advanced support system's mechanism. The laboratory is also equipped with web publishing tools like ArcGIS Advance and ArcIMS Servers. The laboratory is also fitted with various open-source geospatial softwares to expose our students to the powerful open-source environment. The laboratory holds a good repository of geospatial information in both digital and hard formats. The Geoinformatics laboratory has a solid network with several research establishments and Universities working in Geoinformatics and other associated fields both within and outside the country. We also support R&D activities of various centres of The Energy Resources Institute (TERI) located across the country.

### Analytical and Geo-Chemistry Laboratory

The lab is used to do research in understanding the Earth Sciences problems and helps in coming up with sustainable solutions to the issues.







### Biotechnology Laboratory

The Biotechnology Laboratories at TERI SAS are equipped for teaching and research in Biotechnology. The laboratories harbor both basic as well as sophisticated equipment used the modern biotechnology research. In addition to these, the Bioinformatics laboratory is equipped with a high capacity server, workstations and dedicated computers with advanced software such as MATLAB, GCK, PAUP and MacVector. There are two laboratories for M.Sc. teaching and two research laboratories. Furthermore, the students also have access to TERI's research laboratories at Gual Pahari.

### Some of the major equipment installed in the laboratories are listed below:

- |                            |                                |   |
|----------------------------|--------------------------------|---|
| 1. Real time PCR           | 10. Deep Freezers -20 °C       | 19. Spectrophotometer                           |
| 2. Zeta Potential Analyzer | 11. Centrifuges                | 20. SE 600 Ruby Complete, 2D, Vertical Gel unit |
| 3. Refrigerators           | 12. Incubator Shakers          | 21. 2D Gel Electro Power Supply, EPS 601, GE    |
| 4. Microscopes             | 13. Thermal Cyclers            | 22. Gel Doc System XR                           |
| 5. Sonicator               | 14. EVOX-XL Microscope         | 23. Ice Franking Machine                        |
| 6. Rotary Flask Shakers    | 15. Nanodrop Spectrophotometer | 24. Growth Chamber GC - 100                     |
| 7. Laminar Flows           | 16. Gene Pulser X Cell         | 25. Electronic Balances                         |
| 8. Power Pack/Power supply | 17. HB-1000 Hybridization Oven | 26. Deep Freezer -80 °C                         |
| 9. BOD Incubator           | 18. Stereo Zoom Microscope     |   |

For more details on TERI SAS Laboratories, please click on, [www.terisas.ac.in/labs.php](http://www.terisas.ac.in/labs.php)

## Library

One of the key infrastructures of TERI SAS is its well developed and centrally organised Library. The library has a number of electronic services and an ever-wider range of resources in order to support teaching, learning and research. The Library also engages in partnership initiatives with academic colleagues and national and international universities. The services are offered electronically through a web-enabled integrated digital information system. Being an almost completed automated facility in terms of different services, the library at TERI SAS is a go to destination for the students and its services can be accessed by the student at campus as well as off campus.

Major features of the TERI SAS library are:

- |                           |   |
|---------------------------|---|
| 1. Automated Housekeeping | 3. Off-campus Availability of Library Resources |
| 2. Electronic Database    | 4. Member of National Level Library Network     |



# M.Sc. Plant Biotechnology

## Programme Outline

The M.Sc. Plant Biotechnology programme was started in 2008 at TERI School of Advanced Studies (TERI SAS) as an interdisciplinary programme designed to train students to use the available biological techniques such as genetic manipulation, molecular biology, biochemistry and bio-informatics in the welfare and development of plants, agriculture and biotechnology in general. The programme aims on instilling scientific temperament, technical skill-set and inducing logical thought process which is fundamental for research. Along with the research-oriented subjects, the students are also trained in applied mathematics and statistics to enable them to perform a better analysis of their experimental results. Also, the subjects such as bioethics and plant biotechnology management and regulatory issues are incorporated into the course structure to make the students well aware about the legal and ethical aspects of biotechnology and research. The students of this programme acquire interdisciplinary expertise around a strong biotechnology core. This course develops research orientated thinking that develops strong analytical and integrative problem-solving approaches.

## PROGRAMME STRUCTURE

Semester	Course	Credits
Semester 1	All compulsory	21
Semester 2	All compulsory	25
Semester 3	All compulsory	22
Semester 4	Major Project	24
<b>Total</b>		<b>92</b>

### Semester 1

- Conceptual Foundations of Molecular Biology
- Applied Mathematics
- Bioanalytical Techniques
- Concepts in Biochemistry
- Plant Biotechnology and Crop Improvement
- Plant Biotechnology Laboratory - Part 1
- Principles of Genetic Engineering and Recombinant DNA Technology
- Technical Writing (Communication Skills and Technical Writing)

### Semester 2

- Statistics for the Life Sciences
- Bioinformatics and Computational Biology - Part I
- Immunochemistry
- Molecular Cell Biology - From Genes to Communities
- Molecular Markers and Breeding
- Molecular Plant Physiology and Metabolism
- Plant Biotechnology Laboratory - Part 2

### Semester 3

- Bioethics and Public Awareness
- Bioinformatics and Computational Biology
- Genomics and Molecular Genetics
- Multivariate Data Analysis
- Plant Biotechnology Laboratory - Part 3
- Plant Biotechnology Management and Regulatory Issues

### Semester 4

Major Project

# INFRASTRUCTURE FOR BIOTECHNOLOGY

The labs at TERI SAS and the parent organization The Energy and Resources Institute (TERI) are well equipped to enhance the research skills of the students. The theoretical knowledge imparted by the faculty is well complemented by the hands-on training to mould the students to give their best output in whichever field they go. The infrastructure and facilities where the research programmes are undertaken are detailed as follows:

## Laboratories at TERI SAS

- ❖ Teaching Laboratories — Two
- ❖ Research Laboratories — Three
- ❖ Plant Growth Room — One
- ❖ Plant Tissue Culture Facilities
- ❖ Area for Biosafety Level Two — One
- ❖ Net-house for Transgenic Crops (Teri Gram)
- ❖ Computer Laboratory for Bioinformatics — One

## Laboratories at the India Habitat Centre and at TERI Gram

- ❖ Micro-propagation Technology Park
- ❖ Fermentation Facility
- ❖ TERI-Deakin University Nanotechnology Centre at TERI Gram

# PROGRAMME OUTCOME

Since the programme is designed in an interdisciplinary manner, the students develop a diverse set of skills that opens up various sectors for them. The key domains of the course outcome include forensics, plant breeding and development, agricultural development, research and development, bioinformatics, science education and policy, regulations and management and a lot more.



# FACULTY PROFILES



## **Dr. Prateek Sharma**

Vice Chancellor and Professor  
Department of Sustainable Engineering  
Ph.D.

(IIT, Delhi)

**Subjects:** Environmental Engineering



## **Dr. Anandita Singh**

Dean (Students Welfare) and Professor  
Department of Biotechnology

Ph.D.

(Jamia Hamdard University, New Delhi)

**Subjects:** Plant Developmental Biology and Crop Improvement



## **Dr. Chaithanya Madhurantakam**

Associate Professor, Department of Biotechnology

Ph.D.

(IIT, Kharagpur)

**Subjects:** Structural Biology and Protein Engineering



### **Dr. Ramakrishnan Sitaraman**

Professor, Department of Biotechnology

Ph.D.

(University of Alabama, Birmingham)

**Subjects:** Microbial Genetics and Pathogenesis



### **Dr. Shashi Bhushan Tripathi**

Associate Professor, Department of Biotechnology

Ph.D.

(Berhampur University, Orissa)

**Subjects:** Molecular Breeding and Germplasm Characterization



### **Dr. Vidhi Madaan Chadda**

Assistant Professor, Department of Policy and Management Studies

Ph.D.

(Faculty of Law, University of Delhi)

**Subjects:** Law

# Students' Profile



## Akrati Tripathi

**Graduation:** B.Sc. (Hons.) Botany, Hansraj College, Delhi University

**Research Interests:** Biomedical Sciences and Biotechnology, Structural Biology, Molecular Biology, Drug Discovery and Development.

**Major Project Organisation:** National Institute of Immunology

**Major Project Title:** Cloning, Expression and Purification of SARS-CoV-2 proteins.

### Work Experience/Projects/Trainings:

1. Internship on "Advanced Proteomics" at Ethical Edu Fabrica Pvt. Ltd. (2021)
2. Certifications in "Industrial Biotechnology" and "Drug Discovery" (2021).
3. Projects: (a) Quantitative analysis of chloroplast in the light grown and dark grown seedlings of Phaseolus Vulgaris (2019) by Department of Botany, Delhi University. (b) Statistics Project - Survey on influence of social networking sites. (2019), Department of Botany, Delhi University. (c) To study the efficiency of different compost in the growth of Vigna Radiata (2019), Department of Botany, Delhi University. (d) Understanding weather and climate: to study the disease suffered by people due to changing weather patterns (2015), by 23rd National Children Science Congress), Training in Tissue Culture, Bioinformatics Tools, PCR, Drug Discovery in Laboratory, at TERI SAS.



## Ankita Srivastava

**Graduation:** B.Sc.(Hons.) Botany, Gargi College, University of Delhi

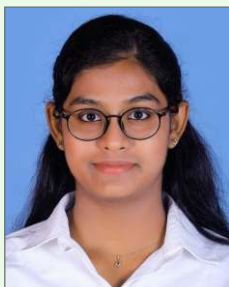
**Research Interests:** Bioinformatics (Drug Designing, Proteomics, Microarray Analysis), Bio-analytical Techniques, IPR, Structural and Molecular Biology, Gene Expression Studies, Molecular Markers and Breeding.

**Major Project Organisation:** TERI

**Major Project Title:** Deciphering bacterial non coding RNAs of functional relevance from Biofilm-forming bacteria

### Work Experience/Projects/Trainings:

- Summer training in "Ipca Laboratories Limited, Dehradun" for 1 month (August, 2021) on Quality Control and Quality Assurance in Pharma Industry.
- Short Term Project Under BIF-DBT (2019-2020) on Bioinformatics analysis of cyclotides in genome sequence of Poaceae members - A step towards identification of environment friendly biopesticides (Gargi College, Miranda House).
- Currently add-on course in-silico attending Certification course on medical coding (ongoing) provided by Biotechnika.



## Anu Deepthi Marini

**Graduation:** B.Sc. (Hons.) Botany, Miranda House, University of Delhi

**Research Interests:** Genetic Engineering, Recombinant DNA Technology, Molecular Markers and Breeding, Crop Improvement, Plant Physiology, Plant Tissue Culture, Genomics, Bioinformatics (DNA/RNA Sequencing, Drug Designing).

**Major Project Organisation:** University of Hyderabad

**Major Project Title:** Significance of Mitochondrial cyanide resistant Alternative Oxidase AOX Pathway in Sustaining Photosynthesis

### Work Experience/Projects/Trainings:

- Summer Internship (June – July, 2019) on the topic "Factors affecting In vitro Pollen Germination in *Vinca rosea*" held by D.S. Kothari Centre for Research and Innovation in Science Education, New Delhi.
- Presented a poster on "The Survival Strategy to Cope up Dry Conditions in Microbes" in the 1st International Conference on Integrative Chemistry, Biology and Translational Medicine, organized by the Centre for Global Health, Hansraj College, University of Delhi and Loyola University Chicago Stritch School of Medicine, USA on 25-26 February, 2019.
- Presented a Poster on "Medicinal Plants for Cancer Treatment" in the 1st International Conference on Integrative Chemistry, Biology and Translational Medicine, organized by the Centre for Global Health, Hansraj College, University of Delhi and Loyola University Chicago Stritch School of Medicine, USA on 25-26 February, 2019.
- Presented a Poster on "EDIBLE VACCINES" at the DBT (Department of Biotechnology) Popularization Programme held on August 2, 2019, organized by Miranda House, University of Delhi under CTEP Programme of DBT (Department of Biotechnology), Government of India.
- Hand on training programme on "Basic Laboratory Techniques" Organized from 5 to 6 September 2017 by D.S. Kothari Centre for Research and Innovation in Science and Education and Department.
- Participated in the workshop of Biodiversity Conclave on "Biodiversity for Everyone's life", held at Miranda House, University of Delhi on 31 August 2018 by Institute of Bioresources and Sustainable Development (IBSD), Manipur.
- Participated in the online training programme on "Women led Sustainable and Decentralised Water Resource Management: A Multi Stakeholder Perspective" on 25 August 2021 to 27 August 2021 organised by National Institute of Disaster Management, Ministry of Home Affairs, Govt. of India in collaboration with IMPRI and Policy Research Institute.





## Khushboo Fulara

**Graduation:** B.Sc. (Hons.) Botany, Bhaskaracharya College of Applied Sciences, University of Delhi

**Research Interests:** Genetic Engineering and Recombinant Technology, Next Generation Sequencing, Molecular Markers and Breeding, Molecular Biology, Functional Genomics, Gene Expression Studies, Stem Cell Research.

**Major Project Organisation:** Jawaharlal Nehru University

**Major Project Title:** Analysis and characterization of SWEET gene family members in chickpea

### Work Experience/Projects/Trainings:

- IASc-INSNA-NASI Summer Research Fellowship in validation of expression of genes in Zebrafish mutants obtained by Next Generation Sequencing at the Institute of Life Sciences, Bhubaneswar, Odisha under the Science Academies' Summer Research Fellowship Programme (2019).
- Workshop on Intellectual Property Rights organised by the Department of Botany, Bhaskaracharya College of Applied Sciences, University of Delhi (August 26, 2019).
- Hands-on Training Programme on DNA Molecule: An Analytical Approach organised by the Department of Biochemistry, Bhaskaracharya College of Applied Sciences, University of Delhi (October 17, 2019).
- Hands-on Training to become well equipped with the knowledge for precise handling of various technical instruments and machines held at the Indian Council of Agriculture Research-Central Potato Research Institute, Shimla, Himachal Pradesh; organised by the Department of Botany, Bhaskaracharya College of Applied Sciences, University of Delhi (March 15, 2019).
- Hands-on Training to become well equipped with the knowledge of multiple techniques for Mushroom cultivation mapped with different categories of cultivated mushroom at the Indian Council of Agriculture Research-Directorate of Mushroom Research, Solan, Himachal Pradesh organised by the Department of Botany, Bhaskaracharya College of Applied Sciences, University of Delhi (March 15, 2019) Pradesh organised by the Department of Botany, Bhaskaracharya College of Applied Sciences, University of Delhi (March 15, 2019).
- Training in Plant Tissue Culture Lab, Plant Molecular Biology Lab, Bioinformatics Lab and Structural Biology Lab at TERI SAS.



## Mehak Kaur

**Graduation:** B.Sc. Botany (Hons.), Gargi College, University of Delhi

**Research Interests:** Immunology, Markers Assisted Breeding, Crop Improvement with Genetic Engineering, CRISPR-Cas system, Microbial Communities and their interactions, Clinical Molecular Biology, Gene Mapping, Plant Biotechnology Management, IPR, Drug Designing and Molecular Docking, Recombinant DNA Technology.

**Major Project Organisation:** TERI Gram

**Major Project Title:** Identification of secondary metabolites from endophytic fungi/ microalgae

### Work Experience/Projects/Trainings:

- Lab Manager with hands on training on animal handling at Zebrafish Research Lab, Daulat Ram College (DU) and Sansriti Foundation (2019-20) along with workshops on animal handling.
- Summer Training in Centre of Molecular Biology, Biotechnology and Bioinformatics, Haryana Agricultural University.
- Project on Study of Anxiolytic Activities of Ashwagandha and Brahmi using Zebrafish larval stress response assays.
- Conducted workshops on toxicity assays, zebrafish handling.
- International Conference on "Frontiers in Biochemistry and Biotechnology: Strategies to Combat Human Diseases".



## Pusuluri Srinija

**Graduation:** B.Sc. (Hons.) Agriculture - Lovely Professional University, Jalandhar, Punjab

**Research Interests:** Plant Genetics, Application of Molecular assisted Breeding Technique for Crop Improvement and Development, Plant Tissue Culture, Genomics - Functional, Molecular Protein, Seed Technology, Structural Molecular Biology, Agro Seed Industries, Drug Designing, FMCG.

**Major Project Organisation:** Indian Agriculture Research Institute (IARI)

**Major Project Title:** Morphological and molecular variation in some pre breeding derivatives in chickpea

### Work Experience/Projects/Trainings:

#### *Independent project:*

- Cultivation of hybrid maize for analysing biotic and abiotic stresses
- Hands on training - Lovely Professional University, Phagwara
- Hands on training in nursery management: Undergone training for 110 days in landscaping techniques. Studied about the ornamental plants their morphology and utility. Learnt training in nursery management, cultivation practices of ornamental plants and landscaping and designing of floriculture crops. Submitted the report on Landscaping of succulents and cacti garden.
- Hydroponics: Submitted report on hydroponics of tomato, zinnia, marigold. This project is done to analyse the growth parameters under protected environment like greenhouse.
- Commercial horticulture: Project report submitted on cultivation techniques of Broccoli using growth hormones and its effects on plant growth.
- **Rural Agriculture Work Experience:** Analysed and collected data from farmers from Maheru village for a period of 110 days. Interacted with the farmers regarding the cultivation practices in various crops and noted the problems faced by farmers with insect pest infestation and other management problems. Submitted the on management of the problems faced by farmers.
- Attended Webinar on Plant Biotechnology for Sustainable Development held by Society of Plant Research - 2021
- Participated 5-day workshop in Hands on training of gene editing by CRISPR held by BDG LifeSciences - 2021
- Co-ordinated 106th Indian Science Congress held in Lovely Professional University -2019



### Shivani Lama

**Graduation:** B.Sc. (Hons.) Biotechnology, Amity Institute of Biotechnology (AIB), Amity University, Noida

**Research Interests:** Cell Biology, Immunology & Enzymology, Genomics, Sequencing, Genetic Engineering, Plant and Food Biotechnology, Plant Tissue Culture and Breeding, Pharmaceuticals and Health Care, Recombinant DNA Technology, Biomaterial Science, Industrial Biotechnology, Drug Designing.

**Major Project Organisation:** ICAR- National institute for plant biotechnology

**Major Project Title:** dsRNA mediated gene silencing

#### Work Experience/Projects/Trainings:

- Personalized Medicine - Project Review on Personalized medicine, Amity University Noida (2018)
- Hands on training on Novel Oral and Topical Care Herbal products, Dabur Research Foundation, Ghaziabad (2019)
- Diagnostic Techniques and Treatment of Salmonellosis and Tuberculosis, Medeor Hospital, Microbiology Department, Qutub Institutional Area, New Delhi (2020)
- Attended Seminars and Conferences organized by Amity University: Novozymes, Biotechnology for Entrepreneurs, Editing Plant Genes: A new area of crop improvement, mass spectrometry imaging of medicinal plants, opportunities in tea industry for young professionals, seven mantras for success in corporate world, communicate connect & conquer.
- Biotechika Webinar: Celebrating 18 years of BT Cotton in India: Scientists and Farmers Meet.
- Online Event - Enabling Food and Nutrition Security in Drylands by ICRISAT.



### Subhodeep Chatterjee

**Graduation:** St. Columba's College Hazaribagh, Jharkhand

**Research Interests:** Bioinformatics, Next Gen Sequencing, Protein Modelling, Molecular Docking, Data Analytics, Data Science.

**Major Project Organisation:** Genomage LLC

**Major Project Title:** Nextflow based DNaseq pipeline deployment and disease based SNPS interpretation

#### Work Experience/Projects/Trainings:

- HackBio Internship 2021 (NGS Data Analysis, Distribution of various SNPs related to different cancer subtypes across different ethnicities and age groups)
- Skill Vertex 2021 Training and Internship in Data Science
- Decoder Technology - Data Science Training
- Data lead Africa BIOINFORMATICS HACKATHON 2021
- Pine Biotech Research Fellowship 2021 also training in - Python, Tableau, SQL, Power BI, R (Under Decodr Technologies).

## KEY RECRUITERS

The TERI SAS facilitates placement of students for major projects and final placements through placement cell in relevant industry and suitable organizations. The students undertake intensive internship with municipal corporations, parastatals and urban development consulting organizations.

Some of the key recruiters have been

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|--|---|
| <ul style="list-style-type: none"> <li>• AIIMS</li> <li>• Cactus Communication</li> <li>• Career 360</li> <li>• CDRJ, Lucknow</li> <li>• Centre for Cellular &amp; Molecular Biology</li> <li>• Department of Plant Molecular Biology, Delhi University</li> <li>• Department of Genetics, Delhi University, South Campus</li> <li>• Edunguru, Sahara Office, Edun Guru</li> <li>• Ennovation Life Sciences</li> <li>• IARI</li> <li>• ICGEB, New Delhi</li> <li>• Indian institute of Chemical Technology</li> <li>• Industrial Info Research Pvt. Ltd., Gurgaon</li> <li>• Innodata</li> <li>• International Center for Genetic Engineering &amp; Biotechnology</li> </ul> | <ul style="list-style-type: none"> <li>• IQVIA</li> <li>• JNU</li> <li>• KEN Research Pvt. Ltd.</li> <li>• Lakshmikumaran &amp; Sridharan Attorneys, New Delhi</li> <li>• Lanll lahiry Salhotra / Lexorbis</li> <li>• NIPGR</li> <li>• NIPGR</li> <li>• NRCPB</li> <li>• Panacca Biotech Iatra</li> <li>• Project Guru</li> <li>• QuintilesIMS</li> <li>• Resource and Information System for Developing Countries (RIS)</li> <li>• TERI</li> <li>• YJ Trivedi &amp; Co. - Law Firm / Krishna &amp; Saurastri Associates</li> </ul> |
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# PLACEMENT PROCEDURE

## PLACEMENT PROCESS AND GUIDELINES FOR RECRUITERS

The campus recruitment activity is conducted to serve dual purposes, placement of the students for their final project which is undertaken in the fourth semester, and the formal job recruitment on completion of the programme.



**Our placement process consists of two phases**

MAJOR PROJECT	
Recruitment Period	Availability of Students
October – December 2021	January – June 2022
JOB PLACEMENT	
Recruitment Period	Availability of Students
October 2021 – June 2022	June 2022 onwards

# PLACEMENT CELL

## Student Placement Coordinator

**Mehek Kaur**

mehak.kaur@terisas.ac.in

**Shivani Lama**

shivani.lama@terisas.ac.in

## Faculty Placement Coordinator

**Dr. Shashi Bhushan Tripathi**

Associate Professor

Department of Biotechnology

shashi.tripathi@terisas.ac.in

## For Further Information, Contact:

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Placement Manager

TERI School of Advanced Studies

10, Institutional Area, Vasant Kunj

New Delhi-110070, India

**Email:** sonika.goyal@terisas.ac.in

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[www.terisas.ac.in](http://www.terisas.ac.in)

Social media handles with images



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