

M.Sc. (Biotechnology)

ELECTIVE COURSES (AUDIT ONLY)	
Course title	Type
Environmental Chemistry and Microbiology	Elective
Introduction to Sustainable Development	Elective
Nanomaterials: Introduction and Applications	Elective
Biodiversity Assessment and Conservation	Elective
Food Security and Agriculture	Elective
Multivariate Data Analysis	Elective
Wildlife Conservation and Management	Elective

SEMESTER 4

Major Project

During fourth semester, students work on a research problem/innovative concept broadly related to the programme using an appropriate methodology that may involve interdisciplinary approaches. This is to allow students the greatest scope to explore a wide range of career options. Students may undertake projects in collaboration with industrial, research, governmental, or non-governmental organizations. This project is guided by a TERI SAS faculty member(s) as well as external researcher(s) from TERI or other organizations. Study tours are undertaken to demonstrate the link between biotechnology and sustainable development.

Placement

A placement cell has been formed for exploring placement opportunities for students. The University facilitates placement of students in industry and suitable organizations, both for major project and final placements.

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**), in fields as varied as microbial biotechnology, mycorrhizal technology, environmental bioremediation, plant tissue culture, and biofuels, to name a few.

About TERI School of Advanced Studies

Academic programmes at the TERI SAS are focused around the challenges of providing the advanced studies rising global population with a limited and degraded natural resource base. In moving towards sustainability, the implicit understanding is that there is no panacea or straight road, with recognized and established methodologies, tools or specializations leading to such development.

The solutions therefore do not lie in a specific subject discipline, but must be appropriate and relevant to the context or the practical problem being addressed. Developing such an understanding among its students is best achieved through exposure to a variety of subjects, tools, and methodologies offered in interdisciplinary mode. This has been the guiding philosophy behind the programmes offered by the TERI SAS and is practised by building a theoretical understanding in courses covering a variety of traditional disciplines, such as ecology, natural and social sciences, governance, policy, law, and engineering.

Over a period of two years, students converge upon a few areas of focus based upon their interest, having been exposed to a new way of thinking that looks at problems not from the lens of a subject specialist, but from the perspective of one who recognizes the complex linkages between man and his environment.

Apart from doctoral research, the TERI SAS offers M.Sc. degree programmes in Environmental Studies and Resource Management, Environmental and Resource Economics, Geoinformatics, Water Science and Governance, Climate Science and Policy, and Biotechnology; MBA in Sustainability Management; and M.Tech. programmes in Renewable Energy Engineering and Management, Water Resources Engineering and Management and Urban Development Management.

The institute offers two M.A. programmes, one in Public Policy and Sustainable Development, and the other in Sustainable Development Practice. TERI SAS is one of a select group of 22 institutions chosen worldwide by the MacArthur Foundation, USA, to run the Sustainable Development Practice programme. The institute uses modern pedagogical tools, richly supplemented by field visits, live industry projects, and hands-on applications. It provides the very best in equipment and instruments, which includes state-of-the-art computer facilities, well-equipped laboratories, video-conferencing facilities, and access to South Asia's most comprehensive library on energy and environment.

TERI SAS has established excellent partnerships and collaborative arrangements with a number of institutions overseas, including Yale University, USA; The Freie University of Germany; Utrecht University, The Netherlands; North Carolina State University, USA; and University of Technology, Australia.

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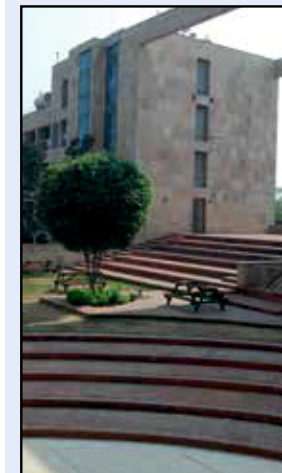
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Deemed to be University
Under Section 3 of the UGC Act
Accredited with
'A' grade by NAAC

M.Sc.
(Biotechnology)





There is a growing realization that India must emerge as a knowledge economy. Given the rapid progress in intellectual enterprises worldwide, higher education must benefit from this continuous stream of knowledge generated through research. With the goal of creating future leaders capable of tackling problems of global societies, TERI SAS offers a Master's programme in Biotechnology for candidates naturally curious in understanding biological phenomena, and interested in developing innovative and useful technologies while subscribing to the philosophy of Sustainable Development.

Background

Biotechnology is an exciting field of modern science. The socio-economic impact of biotechnology in diverse contexts as energy, health care, sustainable agriculture, conservation of biological diversity, and abatement of environmental problems is evident. A biotechnologist must have a multidisciplinary vision, possess relevant skills to generate and interpret data objectively, informed by a sound knowledge base. A biotechnologist has an obligation to communicate scientific outcomes to public in a responsible, free, and transparent manner. With multitudes of organizations (Academia and Industry) dedicated to discoveries and scientific innovations, management of Intellectual Property forms a key aspect of Biotechnology. Furthermore, biosafety and ethics constitute the key foundation of biotechnological applications. Therefore, knowledge in regulatory framework and risk analysis is essential.

M.Sc. (Biotechnology)

M.Sc. in Biotechnology (BT) is aimed at exploring sustainable solutions for agriculture, energy, environment and health sectors. The programme is compliant with the choice-based credit system (CBCS) of UGC, Govt. of India and is aligned to the proposed New Education Policy (NEP) 2020. The programme further aims to contribute to the National missions viz; National Mission for Sustainable Agriculture, National Mission for sustaining the Himalayan Ecosystem and National Water Mission. The end-objective of the programme is to meet the sustainable developmental goals such as zero hunger, good health and well being and imparting quality education.

Specializations offered:

- M.Sc. in Biotechnology (specialization in Plant Biotechnology)
- M.Sc. in Biotechnology (specialization in Microbial Biotechnology)



Programme Structure

- The M.Sc. Biotechnology programme is a two-year programme divided into four semesters. A student is required to complete 78 credits for the completion of the programme and the award of degree.
- The M.Sc. Biotechnology programme provides options for specialization by completing a set of specialisation specific courses. Currently, two specialisations are being offered under the Programme: i) Plant Biotechnology and ii) Microbial Biotechnology.
- The entire M.Sc. Biotechnology Programme is comprised of core courses (52 credits), elective courses (audit only but equivalent to minimum 4 credits), Specialisation specific courses (8 credits) and a Major Project (16 credits). In addition, two courses, i) Communication Skills and Technical Writing and ii) Applied mathematics have been added as compulsory audit courses.
- The specialisation specific courses will be offered during second and third semesters. A student can opt for specialisation specific courses related to only one of the available specialisations.
- The elective courses are to be taken only as audit course only and the grades in those courses will not be considered while calculating the CGPA. A minimum 4 credits equivalent of elective courses need to be completed during the Programme. There is no upper limit for the number and credit equivalent for Elective courses. The Elective courses may be taken in any semester when offered by the concerned Department and provided it doesn't conflict with any other course taken by the student.
- At the start of Semester 2, the students will be required to choose any one of the two specialisations. Maximum of 60% of the total number of students can be allotted a particular specialisation. Allotment of specialisation will be done based on a combination of merit (as per the Semester 1 grades) and preference.
- A strong component of Bioinformatics in the form of hands-on practical equivalent to 3 credits has been included in Semesters 2 and 3. This is in addition to the theoretical orientation on Bioinformatics of 2 credits that will be provided in Semester 1.

Eligibility Criteria: A Bachelor's degree in Sciences/Engineering/Technology.

Selection Procedure

Applications are invited from candidates through advertisements published on TERI SAS website (www.terisas.ac.in) and also in leading national newspapers and social media platforms. Admission to the M.Sc. Biotechnology Programme is made on the basis of a combined entrance examination followed by an interview conducted by a faculty panel from the Department of Biotechnology, TERI SAS.

Pedagogical Tools

The classroom/online lectures are complemented with extensive laboratory practical, case studies, classroom discussions, and guest lectures by experts. During the fourth semester, students are involved in full-time research for their major project.

Programme Outline*

Year	Courses	Credits	Duration
First Year			
1st Semester	7 core courses of 2-7 credits each, and 2 core audit courses	21	15 weeks
2nd Semester	7 core courses of 2-7 credits and 1 course of 2 credits in the area of specialisation**	23	15 weeks
Second Year			
3rd Semester	4 core courses of 2-7 credits and 1 course of 2 credits in the area of specialisation**	18	15 weeks
4th Semester	Major project	16	15 weeks

*In addition to above, a minimum 4 credits equivalent of elective courses (audit only) listed below need to be completed during the Programme which may be taken in any semester when offered by the concerned Department and provided it doesn't conflict with any other course taken by the student. There is no upper limit for the number and credit equivalent for Elective courses.

**Specialisation specific practical component equivalent to 2 credits will carried out under Biotechnology Laboratory- Part 2 (2nd Semester) and Biotechnology Laboratory- Part 3 (3rd Semester) each

SEMESTER 1	
Course title	Type
Biotechnology Laboratory - Part 1	Core
Communication Skills and Technical Writing	Audit
Principles of Genetic Engineering and Recombinant DNA Technology	Core
Applied Mathematics	Audit and bridge course
Conceptual Foundations of Molecular Biology	Core
Principles of Biochemistry and Biophysics	Core
Bioanalytical Techniques	Core
Plant and Animal Biotechnology	Core
Bioinformatics and Computational Biology - Part 1	Core

SEMESTER 2	
Course title	Type
Conservation Genetics and Genomics	Core
Biotechnology Laboratory - Part 2	Core*
Introduction to Nanobiotechnology	Core
Molecular Microbiology and Immunology	Core
Statistics for The Life Sciences	Core
Molecular Cell Biology - From Genes to Communities	Core
Genome Structure and Diversity: Concepts and Methodologies	Core
Molecular Plant Physiology and Metabolism	Specialisation (Plant Biotechnology)
Microbial Pathogenesis	Specialisation (Microbial Biotechnology)

*Specialisation specific practical component equivalent to 2 credits will carried out under Biotechnology Laboratory- Part 2

SEMESTER 3	
Course title	Type
Biotechnology Laboratory - Part 3	Core*
Bioethics, IPR and Regulations in Biotechnology	Core
Gene Expression Analysis and Transcriptomics	Core
Proteomics and Protein Engineering	Core
Functional Genomics in Plants	Specialisation (Plant Biotechnology)
Bioprocess Engineering and Environmental Biotechnology	Specialisation (Microbial Biotechnology)

*Specialisation specific practical component equivalent to 2 credits will carried out under Biotechnology Laboratory- Part 3