Somaiya School of Basic and Applied Sciences

Faculty of Science

Somaiya Vidyavihar University, Mumbai

Admission Manual

PhD Programme – Environment Science

AY 2025-26 onwards

Visit for Further Details: **https://www.somaiya.edu/en/phd/**

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Somaiya Vidyavihar University, Mumbai

About Somaiya Vidyavihar University, Mumbai

On 26th August 2019, Somaiya Vidyavihar University, Mumbai became a reality!

After six decades of fostering a holistic teaching and learning experience and establishing reputed educational institutions, Somaiya Vidyavihar University, Mumbai, has achieved a significant milestone. It has become the first self-financed private university in Mumbai under the Maharashtra Self-Financed Universities (Establishment and Regulation) Act, 2013.

We aspire to build and support a world-class institution—one that is proudly Indian and excels in education, research, and service. Somaiya Vidyavihar University, Mumbai, will be a hub for preserving, disseminating, and creating knowledge. It will have a global impact through its ideas and a universal commitment to service. Here, students and faculty can embrace the "Freedom of Possibilities," pursue their passions, and, most importantly, discover themselves.

Our History and Vision

An all-round education must integrate Indian culture, values & morality into the curriculum.

Somaiya Vidyavihar was founded on September 9, 1959, by Padmabhushan Shri K.J. Somaiya (1902–1999), a visionary leader with sharp business acumen, a balanced perspective, and a deep commitment to social progress. His dream of shaping young minds through quality education led him to establish the Somaiya Trust in 1953, acquiring a vast expanse of land in Ghatkopar—then a sparsely populated area.

Driven by his passion for education and inclusivity, he later founded the Girivanvasi Pragati Mandal, the K.J. Somaiya Medical Trust, and the Girivanvasi Education Trust, along with several sister institutions, to provide greater access to learning and opportunity. Inspired by Swami Vivekananda's words, *"We want that education by which character is formed, strength of mind is increased, the intellect expanded, and by which one can stand on one's own feet,"* he dedicated his life to fostering knowledge and empowerment.

Over the past six decades, Somaiya Vidyavihar has grown into a thriving educational ecosystem with 34 institutions across diverse fields, including Humanities & Social Sciences, Engineering, Medicine, Management, Education, Dharma Studies, Pure Sciences, and Commerce & Business Studies. Today, with a vibrant 50-acre campus, it is home to over 39,000 students and 3,000 faculty and staff, continuing its legacy of excellence in education and innovation.

With PhD programmes in various faculties, we provide an innovative platform for research aspirants to make a niche of their own to impact society and life.

About Somaiya School of Basic and Applied Sciences, SVU

The Somaiya School of Basic and Applied Sciences (SSBAS) is a newly established institution under the Faculty of Sciences at Somaiya Vidyavihar University, Mumbai. Initially it is a part of S.K. Somaiya College, SSBAS has grown into a center of academic and research excellence. With six departments, the school offers six undergraduate and eight postgraduate programs, along with a Doctor of Philosophy (Ph.D.) program in six disciplines. SSBAS is equipped with state-of-the-art research laboratories, advanced instrumentation, and cutting-edge software, fostering a seamless integration of science and technology research. The school has successfully secured ₹1 crore+ in research funding from various governmental agencies, reinforcing its commitment to advancing fundamental research for societal development.

1. **Eligibility criteria for PhD Admission**	
Subject to the conditions stipulated in the SVU PhD Regulations, the following candidate are eligible to seek admission to the PhD Programme	
1. Education Qualification	
i.	Master's degree (2 year or 1 year) or a professional degree declared equivalent to the Master's degree by the corresponding statutory regulatory body, with at least 55% marks in aggregate or its equivalent as per UGC regulations.
ii.	Candidate seeking admission after a 4-year/8-semester bachelor's degree programme (B.Tech / B.E, B.Pharma, MBBS or BDS or BAMS or BHMS or B.Sc (Honors) should have a minimum of 75% marks in aggregate or its equivalent as per UGC regulations
iii.	A person whose Masters dissertation has been evaluated and the viva-voce is pending may be admitted to the PhD Programme but subject to completion of Master's degree before provisional admission to SVU PhD Programmes.
iv.	Candidates possessing a Degree considered equivalent to Master's Degree of an Indian Institution, from a Foreign Educational Institution accredited by an Assessment and Accreditation Agency which is approved, recognized or authorized by an authority, established or incorporated under a law in its home country or any other statutory authority in that country for the purpose of assessing, accrediting or assuring quality and standards of educational institutions, shall be eligible for admission to PhD Programme
2. **PhD Entrance Exam**	
i.	MUST qualify a passing score of PhD Entrance Examination of SVU. This is a mandatory eligibility criteria for all candidates with exemptions mentioned in Point 2.(ii)
ii.	Exemption Criteria from SVU PhD Entrance Examination are: 1. Candidates who qualified in UGC - CSIR -NET-JRF/ ICMR-JRF / DBT-JRF (BET)/ INSPIRE/ GPAT/ICAR/JEST/ Qualified/valid GATE score in relevant branches /Prime Minister's Fellowships and those qualified in any of the UGC recognized national or state level eligibility tests with a valid fellowship/scholarship in the related subject. 2. Candidates with valid GMAT score for last 2 years (1st Jan 2020 to 31st Dec 2022), minimum GMAT score 350 3. Any candidates having 5 year of teaching/research experience and have published research paper in SCOPUS ; Web of science journal/published patents/grant received from government agencies will be exempted from appearing for the SVU PhD entrance exam but will be required to appear for an interview at the respective departments. The exemption criteria will be applicable ONLY when relevant document are uploaded during application submission. If relevant documents are not submitted, the candidate have to appear for Entrance exam.
Note: However, the candidates who fulfill the above criteria MUST fill the application form as per the schedule displayed on the website.	
3. Other Documents	

1. UG Degree or equivalent Mark List 2. UG Degree certificate 3. PG Degree or equivalent Mark List 4. PG Degree or equivalent certificate 5. AADHAR card 6. Degree equivalence / eligibility certificate – wherever is applicable 7. Transfer Certificate and /or Leaving Certificate 8. Migration certificate 9. Two colour passport size Photograph 10. If appearing the PG degree examination – bonafide certificate 11. If employed, then No Objection Certificate (NOC) from the employer – at the time of provisional admission
4. Important Links
UGC Notification 2022 (Link)

2. Categories of Ph D Students
1. Candidates with externally funded scholarships/Fellowships; (a full tuition fee waiver will be provided to candidates who join as JRF/SRF under government of INDIA research funded scheme) 2. Candidates who work in funded projects within the University or in approved research centres which are collaborating with the University; 3. Jointly guided PhD or Co-supervised PhD with International Universities; 4. Teaching/work integrated research candidates who are the faculty/employees in pursuit of advancing their academic qualification, recommended by the Head of the Institution and the Academic Advisory Committee. This provision is for those candidates who shall take an undertaking that their routine responsibilities would be duly attended and under no circumstances compromised. The university shall reserve the rights to consider the registration of candidates who do not adhere to these guidelines; 5. Teaching and Research Associates of the Somaiya Vidyavihar University. 6. "Somaiya Vidyavihar University Research fellow under Chancellor's Scholarships Programme". 7. "Any candidates having 5 year of teaching/research experience and have publish research paper in SCOPUS; Web of science journal/published patents/grant received from government agencies will be excepted from appearing for the SVU PhD entrance exam but will be required to appear for an interview at the respective departments" 8. Candidate is permitted to pursue studies on a part-time basis provided all the conditions stipulated in UGC 2022 regulations are fulfilled.

3. Overview of Steps involved in PhD Programme	
Sr.No.	Steps
PhD Pre-selection Phase	
1.	Advertisement / Call for SVU PhD entrance exam on website /media handles
2.	Acceptance of the applications for PhD entrance examination along with the applications processing fee

3.	Execution of PhD entrance examination for all PhD programmes
4.	Declaration of PhD entrance examination results
5.	Selection process - Display of list of eligible shortlisted candidates for interview
6.	One- on -one Interviews of shortlisted candidates before an expert panel
7.	Display of selected candidates for provisional admission - Selection process complete
Provisional Admission Phase	
8.	Provisional admission and payment of fees in accounts/admin office of the constituent unit of Somaiya Vidyavihar University, Mumbai.
9.	Orientation and initiation of course work (1 year – 2 semesters)
10.	First semester encompasses research methodology & publication ethics along with subject specific topic. Second semester majorly focus on building research, technical & soft skills. It includes research activities, lab rotation and research proposal drafting & presentation and its evaluation.
11.	ATKT examination for the semester I and II for unsuccessful candidates or for grade improvement
12.	Issue of mark sheets for course work of semester I and II
Allotments & Registrations	
13.	Allotment of the guide at individual constituent unit-level /department (within the first six months of provisional admission)
14.	Topic approval of the thesis work within 2-3 months after Qualifying course work examination
15.	Registration for PhD programme
PhD Phase	
16.	Appointment of Examiners and chairman from Research Committee
17.	Annual Progress Seminars (APS) and Intermediate Progress Seminar (IPS) for the academic year by Doctoral Advisory Committee (DAC)
Submission & defence	
18.	Approval of examiners to present pre-synopsis in one of the APS and IPS
19.	Presentation of pre-synopsis and its approval by the examiners
20.	Submission of thesis to COE office
21.	Sending the thesis to reviewers
22.	Receipt of reviews about thesis from the reviewers
23.	The final defense of the thesis
24.	Submission of the final corrected thesis after defense
25.	Issue of provisional PhD certificate
26.	Issue of PhD certificate
	The steps and the progress evaluation of PhD students by the committee/examiners/experts will be as per the provisions of PhD regulations

4. Pattern and syllabus of SVU PhD Entrance Examination
Paper-1 Qualitative Test – 40 marks a) Essay Writing – 20 marks b) Comprehension – 20 marks (50% choice in selecting questions in paper I)
Paper – 2 Subject Specific Test – 60 marks a) Multiple Choice Questions – 20 marks (Attempt 20 out of 30 questions) b) Subject Objective Questions – 40 marks (with 50% Choice)

5. About Course Work
The course work will be of one academic year (two semesters) and out of which the first semester will be full time. It is expected that during the first semester, the student will report the college/department/section/laboratory for attending the sessions as per Timetable. The student will have to complete a total of 14 credits (semester I) + 5 credits (semester II) = total 19 credits with CGPI as per the PhD regulations to become eligible for the registration to PhD programme.

6. Fee Structure of PhD Program (This is common across disciplines, all categories of students)		
Particulars	@Total Fees per annum (₹)	
	First Year	Second Year Onwards
Tuition Fee	30,000/-	30,000/-
Development Fee	10,000/-	10,000/-
Examination Fee	10,000/-	10,000/-
Caution money Deposit (Refundable)	1,000/-	-----
Library Deposit (Refundable)	2,000/-	-----
Total (₹)	53,000/-	50,000/-
@ If paid provisional admission fee then should be deducted from total fee		
Link for fees payment (Fees will be accepted via online payment gateway only and in no case, it can be paid using any other type of mode of payment and to any office/person)	https://myaccount.somaiya.edu/#/login	

7. Registration, Synopsis & Ph D Thesis Submission Fees	
Particulars	Amount
Registration fees	5000
Approval of Synopsis of PhD Thesis Topic	5000
PhD Thesis Submission	10000
Total	20,000/-

Note:

1. Registration fees to be paid by the PhD scholars before submitting the application for Registration for Ph D.
2. Synopsis PhD Thesis Submission fees to be paid by the PhD scholars before submission of synopsis.

8. Payment of fees schedule for Provisional admission and subsequent years of PhD programme

Program Academic Year	Particulars	Amount in Rupees (₹)	Payment Schedule
First Year	Total fee	53,000/-	Within eight days from the date of receiving the offer letter
Second Year and Onwards	Total fee	50,000/-	Within first week from the commencement of the new Academic Year
Link for fees payment (Fees will be accepted via online payment only and in no case it can be paid using any other mode of payment and to any office/person)		https://myaccount.somaiya.edu/#/login	
Note: Students have to pay the full fees of the program per year till the submission of the thesis			

9. Guidelines to make fee payment in Online Mode

There is a provision of ONLINE PAYMENT of college fees for student's' convenience 24x7 on or before the scheduled due date. Student will get notification from the institute in three ways.

1) SMS
2) Email
3) Notification on myaccount.somaiya.edu portal

In the notification there will be a link to make the payment. You just need to click on the link and follow below simple steps to make the payment.

STEP 1: Link will take you to myaccount.somaiya.edu portal. Use Somaiya SVV Net ID and password to login. Want to know more about myaccount.somaiya.edu click on https://somaiya.edu/media/pdf/SVVNetID_and_EmaiI%20id.pdf

STEP 2: Login, select 'instalments' and click on "Pay Now".

STEP 3: System will redirect to Online Payment Gateway. Fill in the required information and follow payment options to complete the payment cycle.

STEP 4: After the successful payment, the payment receipt will be available at student's MyAccount portal

10. Admission Cancellation policy of PhD programme
(All Categories of PhD Students)

If the candidate has accepted the allotted seat by paying the fees and later chooses/decides to withdraw from the programme of study, then cancellation option is available at his/her MyAccount login.

The School shall follow the below system for deduction of fees against the cancellation request for the candidate.

Sr. No.	Point of time when the application for admission cancellation is received by the School	Applicable Deduction
1	15 days or more before the date of commencement of academic term	Rs 5,000/-
2	Less than 15 days before the date of commencement of the academic term	10% of total fees
3	Less than 15 days from the date of commencement of the academic term	20% of total fees
4	On or beyond the 15th day but within six weeks from the date of commencement of the academic term	50% of total fees
5	More than six weeks from the date of commencement of the academic term	100% of total fees

Note:

- Total Fees for the program per year is Rs. 50,000/- for All Categories of PhD Students
- Tentative date of commencement of every academic term will be announced on website.

Typical Sample example for further illustration to know about cancellation charges with reference to the date of commencement of term

Refer the below example for clarification of PhD admission cancellation policy

Assume that the academic term commences from 15th July of a particular academic year. Based on this assumption, following table illustrates important dates of cancellation policy:

Illustration:

Sr. No.	**Point of time when an application for admission cancellation is received by School**	**Applicable Deduction**

1	Cancellation on or before 30th June (up to 11.59pm)	Rs 5,000/-
2	Any time from 1st July to 14th July (up to 11.59pm)	10% of total fees
3	Any time from 15th July to 28th July (up to 11.59pm)	20% of total fees
4	Any time from 29th July to 25th August (up to 11.59pm)	50% of total fees
5	After 25th August	100% of total fees

11. Process of getting documents submitted return
After verifications of documents, within 7 days, documents will be returned to students.

Somaiya School of Basic and Applied Sciences

Faculty of Science

Environmental Science

About Research Center

Department of Environmental Sciences, S. K. Somaiya College at the Somaiya Vidyavihar University, Mumbai offering a two year's full time postgraduate (PG) course in Environmental Science. M.Sc. in environment science provide students with the knowledge, expertise, and skills to investigate and understand the impact of humans on the environment and start building sustainable solutions. Our academic staff share their pioneering research from a range of fields including climate change, biodiversity, conservation, and sustainability, in terrestrial ecosystems. Applying the latest techniques in the laboratory and the field, you will be ready to shape the future of fields from ecosystem management to environmental sustainability.

Highlights: Department is associated with

- ✓ Unique Field Emersion Program in Ecology and Biodiversity
- ✓ Well-furnished classrooms and well-established laboratories with sophisticated instrumentation facilities.
- ✓ Research collaboration with research institutes/Govt agencies/Industries like NCL, MPCB/NEERI etc
- ✓ The course develops a new approach to tackle the various environmental as well as climate change issues and create bring up the ability to resolve them in more sustainable manner.
- ✓ The course is designed in a way to enable the student to make use of the latest sustainable technologies to perform their work effectively and efficiently.

Eligibility at UG/PG Degree	
Branch of study at UG	Life Sciences Biotechnology Microbiology Biochemistry Environmental Sciences Botany Zoology Bioinformatics.

Branch of study at PG	Life Sciences Biotechnology Microbiology Biochemistry Environmental Sciences Bioinformatics.

Syllabus for Entrance Examination in Environment Science

Unit-I: Fundamentals of Environmental Sciences

Definition, Principles and Scope of Environmental Science.

Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere.

Laws of thermodynamics, heat transfer processes, mass and energy transfer across various interfaces, material balance.

Meteorological parameters - pressure, temperature, precipitation, humidity, mixing ratio, saturation mixing ratio, radiation and wind velocity, adiabatic lapse rate, environmental lapse rate. Wind roses.

Interaction between Earth, Man and Environment. Biogeographic provinces of the world and agro-climatic zones of India. Concept of sustainable development.

Natural resources and their assessment. Remote Sensing and GIS: Principles of remote sensing and GIS. Digital image processing and ground truthing. Application of remote sensing and GIS in land cover/land use planning and management (urban sprawling, vegetation study, forestry, natural resource), waste management and climate change.

Environmental education and awareness. Environmental ethics.

Unit-II: Environmental Chemistry

Fundamentals of Environmental Chemistry: Classification of elements, Stoichiometry, Gibbs' energy, chemical potential, chemical kinetics, chemical equilibria, solubility of gases in water, the carbonate system, unsaturated and saturated hydrocarbons, radioisotopes.

Composition of air. Particles, ions and radicals in the atmosphere. Chemical speciation. Chemical processes in the formation of inorganic and organic particulate matters, thermochemical and photochemical reactions in the atmosphere, Oxygen and Ozone chemistry. Photochemical smog.

Hydrological cycle. Water as a universal solvent. Concept of DO, BOD and COD. Sedimentation, coagulation, flocculation, filtration, pH and Redox potential (Eh).

Inorganic and organic components of soils. Biogeochemical cycles – nitrogen, carbon, phosphorus and sulphur.

Toxic chemicals: Pesticides and their classification and effects. Biochemical aspects of heavy metals (Hg, Cd, Pb, Cr) and metalloids (As, Se). CO, O3, PAN, VOC and POP. Carcinogens in the air.

Principles of analytical methods: Titrimetry, Gravimetry, Bomb Calorimetry, Chromatography (Paper Chromatography, TLC, GC and HPLC), Flame photometry, Spectrophotometry (UV-VIS, AAS, ICP-AES, ICP-MS), Electrophoresis, XRF, XRD, NMR, FTIR, GC-MS, SEM, TEM.

Unit-III: Environmental Biology

Ecology as an inter-disciplinary science. Origin of life and speciation. Human Ecology and Settlement.

Ecosystem Structure and functions: Structures - Biotic and Abiotic components. Functions - Energy flow in ecosystems, energy flow models, food chains and food webs. Biogeochemical cycles, Ecological succession. Species diversity, Concept of ecotone, edge effects, ecological habitats and niche. Ecosystem stability and factors affecting stability. Ecosystem services.

Basis of Ecosystem classification. Types of Ecosystem: Desert (hot and cold), forest, rangeland, wetlands, lotic, lentic, estuarine (mangrove), Oceanic.

Biomes: Concept, classification and distribution. Characteristics of different biomes: Tundra, Taiga, Grassland, Deciduous forest biome, Highland Icy Alpine Biome, Chapparal, Savanna, Tropical Rain forest.

Population ecology: Characteristics of population, concept of carrying capacity, population growth and regulations. Population fluctuations, dispersion and metapopulation. Concept of 'r' and 'k' species. Keystone species.

Community ecology: Definition, community concept, types and interaction - predation, herbivory, parasitism and allelopathy. Biological invasions.

Biodiversity and its conservation: Definition, types, importance of biodiversity and threats to biodiversity. Concept and basis of identification of 'Hotspots'; hotspots in India. Measures of biodiversity. Strategies for biodiversity conservation: *in situ*, *ex situ* and *in vitro* conservation. National parks, Sanctuaries, Protected areas and Sacred groves in India. Concepts of gene pool, biopiracy and bio-prospecting. Concept of restoration ecology. Extinct, Rare, Endangered and Threatened flora and fauna of India.

Concept of Industrial Ecology.

Toxicology and Microbiology: Absorption, distribution and excretion of toxic agents, acute and chronic toxicity, concept of bioassay, threshold limit value, margin of safety, therapeutic index, biotransformation. Major water borne diseases and air borne microbes.

Environmental Biotechnology: Bioremediation – definition, types and role of plants and microbes for *in situ* and *ex situ* remediation. Bioindicators, Biofertilizers, Biofuels and Biosensors.

Unit-IV: Environmental Geosciences

Origin of earth. Primary geochemical differentiation and formation of core, mantle, crust, atmosphere and hydrosphere. Concept of minerals and rocks. Formation of igneous and metamorphic rocks. Controls on formation of landforms - tectonic including plate tectonic and climatic. Concept of steady state and equilibrium, Energy budget of the earth. Earth's thermal environment and seasons. Coriolis force, pressure gradient force, frictional force, geo-strophic wind field, gradient wind. Climates of India, western disturbances, Indian monsoon, droughts, *El Nino*, *La Nina*. Concept of residence time and rates of natural cycles. Geophysical fields.

Weathering including weathering reactions, erosion, transportation and deposition of sediments. Soil forming minerals and process of soil formation, Identification and characterization of clay minerals, Soil physical and chemical properties, soil types and climate control on soil formation, Cation exchange capacity and mineralogical controls.

Geochemical classification of elements, abundance of elements in bulk earth, crust, hydrosphere and biosphere. Partitioning of elements during surficial geologic processes, Geochemical recycling of elements. Paleoclimate.

Distribution of water in earth, hydrology and hydrogeology, major basins and groundwater provinces of India, Darcy's law and its validity, groundwater fluctuations, hydraulic

conductivity, groundwater tracers, land subsidence, effects of excessive use of groundwater, groundwater quality. Pollution of groundwater resources, Ghyben-Herzberg relation between fresh-saline water.

Natural resource exploration and exploitation and related environmental concerns. Historical perspective and conservation of non-renewable resources.

Natural Hazards: Catastrophic geological hazards - floods, landslides, earthquakes, volcanism, avalanche, tsunami and cloud bursts. Prediction of hazards and mitigation of their impacts.

Unit-V: Energy and Environment

Sun as source of energy; solar radiation and its spectral characteristics. Fossil fuels: classification, composition, physico-chemical characteristics and energy content of coal, petroleum and natural gas. Shale oil, Coal bed Methane, Gas hydrates. Gross-calorific value and net-calorific value.

Principles of generation of hydro-power, tidal energy, ocean thermal energy conversion, wind power, geothermal energy, solar energy (solar collectors, photo-voltaic modules, solar ponds).

Nuclear energy - fission and fusion, Nuclear fuels, Nuclear reactor – principles and types.

Bioenergy: methods to produce energy from biomass.

Environmental implications of energy use; energy use pattern in India and the world, emissions of CO2 in developed and developing countries including India, radiative forcing and global warming. Impacts of large scale exploitation of solar, wind, hydro and nuclear energy sources.

Unit-VI: Environmental Pollution and Control

Air Pollution:

Sources and types of Pollutants - Natural and anthropogenic sources, primary and secondary pollutants. Criteria air pollutants. Sampling and monitoring of air pollutants (gaseous and particulates); period, frequency and duration of sampling. Principles and instruments for measurements of (i) ambient air pollutants concentration and (ii) stack emissions. Indian National Ambient Air Quality Standards. Impact of air pollutants on human health, plants and materials. Acid rain. Dispersion of air pollutants. Mixing height/depth, lapse rates, Gaussian plume model, line source model and area source model. Control devices for particulate matter: Principle and working of: settling chamber, centrifugal collectors, wet collectors, fabric filters and electrostatic precipitator. Control of gaseous pollutants through adsorption, absorption, condensation and combustion including catalytic combustion. Indoor air pollution, Vehicular emissions and Urban air quality.

Noise Pollution:

Sources, weighting networks, measurement of noise indices (Leq, L10, L90, L50, LDN, TNI). Noise dose and Noise Pollution standards. Noise control and abatement measures: Active and Passive methods. Vibrations and their measurements. Impact of noise and vibrations on human health.

Water Pollution:

Types and sources of water pollution. Impact on humans, plants and animals. Measurement of water quality parameters: sampling and analysis for pH, EC, turbidity, TDS, hardness, chlorides, salinity, DO, BOD, COD, nitrates, phosphates, sulphates, heavy metals and organic contaminants. Microbiological analysis – MPN. Indian standards for drinking water (IS:10500, 2012). Drinking water treatment: Coagulation and flocculation, Sedimentation and Filtration, Disinfection and Softening. Wastewater Treatment: Primary, Secondary and Advanced treatment methods. Common effluent treatment plant.

e-waste: classification, methods of handling and disposal.

Fly ash: sources, composition and utilisation.

Plastic waste: sources, consequences and management.

Unit-VIII: Environmental Assessment, Management and Legislation

Aims and objectives of Environmental Impact Assessment (EIA). Environmental Impact Statement (EIS) and Environmental Management Plan (EMP). EIA Guidelines. Impact Assessment Methodologies. Procedure for reviewing EIA of developmental projects. Life-cycle analysis, cost-benefit analysis. Guidelines for Environmental Audit. Environmental Planning as a part of EIA and Environmental Audit. Environmental Management System Standards (ISO14000 series). EIA Notification, 2006 and amendments from time to time. Eco-labeling schemes.

Risk Assessment - Hazard identification, Hazard accounting, Scenarios of exposure, Risk characterization and Risk management.

Overview of Environmental Laws in India: Constitutional provisions in India (Article 48A and 51A). Wildlife Protection Act, 1972 amendments 1991, Forest Conservation Act, 1980, Indian Forest Act, Revised 1982, Biological Diversity Act, 2002, Water (Prevention and Control of Pollution) Act, 1974 amended 1988 and Rules 1975, Air (Prevention and Control of Pollution) Act, 1981 amended 1987 and Rules 1982, Environmental (Protection) Act, 1986 and Rules 1986, Motor Vehicle Act, 1988, The Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016, The Plastic Waste Management Rules, 2016, The Bio-Medical Waste Management Rules, 2016, The Solid Waste Management Rules, 2016, The e-waste (Management) Rules 2016, The Construction and Demolition Waste Management Rules, 2016, The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000, The Batteries (Management and Handling) Rules, 2010 with Amendments, The Public Liability Insurance Act, 1991 and Rules 1991, Noise Pollution (Regulation and Control) Rules, 2000, Coastal Regulation Zones (CRZ) 1991 amended from time to time.

National Forest Policy, 1988, National Water Policy, 2002, National Environmental Policy, 2006.

Environmental Conventions and Agreements: Stockholm Conference on Human Environment 1972, Montreal Protocol, 1987, Conference of Parties (COPs), Basel Convention (1989, 1992), Ramsar Convention on Wetlands (1971), Earth Summit at Rio de Janeiro, 1992, Agenda-21, Global Environmental Facility (GEF), Convention on Biodiversity (1992), UNFCCC, Kyoto Protocol, 1997, Clean Development Mechanism (CDM), Earth Summit at Johannesburg, 2002, RIO+20, UN Summit on Millennium Development Goals, 2000, Copenhagen Summit, 2009. IPCC, UNEP, IGBP.

Unit-IX: Statistical Approaches and Modelling in Environmental Sciences

Attributes and Variables: types of variables, scales of measurement, measurement of Central tendency and Dispersion, Standard error, Moments – measure of Skewness and Kurtosis, Basic concept of probability theory, Sampling theory, Distributions - Normal, log-normal, Binomial, Poisson, t, x^2 and F-distribution. Correlation, Regression, tests of hypothesis (t-test, x^2-test ANOVA: one-way and two-way); significance and confidence limits.

Approaches to development of environmental models; linear, simple and multiple regression models, validation and forecasting. Models of population growth and interactions: Lotka-Voltera model, Leslie's matrix model.

Unit-X: Contemporary Environmental Issues

Global Environmental Issues – Biodiversity loss, Climate change, Ozone layer depletion. Sea level rise. International efforts for environmental protection.

National Action Plan on Climate Change (Eight National missions – National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat,

National Water Mission, National Mission for Sustaining the Himalayan Ecosystem, National Mission for a
'Green India', National Mission for Sustainable Agriculture, National Mission on Strategic Knowledge for Climate Change).
Current Environmental Issues in India: Environmental issues related to water resource projects - Narmada dam, Tehri dam, Almatti dam, Cauvery and Mahanadi, Hydro-power projects in Jammu & Kashmir, Himachal and North-Eastern States.
Water conservation-development of watersheds, Rain water harvesting and ground water recharge.
National river conservation plan – Namami Gange and Yamuna Action Plan.
Eutrophication and restoration of lakes. Conservation of wetlands, Ramsar sites in India.
Soil erosion, reclamation of degraded land, desertification and its control.
Climate change - adaptability, energy security, food security and sustainability.
Forest Conservation – Chipko movement, Appiko movement, Silent Valley movement and Gandhamardhan movement. People Biodiversity register.
Wild life conservation projects: Project tiger, Project Elephant, Crocodile Conservation, GOI-UNDP Sea Turtle project, Indo-Rhino vision.
Carbon sequestration and carbon credits.
Waste Management – Swachha Bharat Abhiyan.
Sustainable Habitat: Green Building, GRIHA Rating Norms.
Vehicular emission norms in India.
Epidemiological Issues: Fluorosis, Arsenocosis, Goitre, Dengue.
Environmental Disasters: Minnamata Disaster, Love Canal Disaster, Bhopal Gas Disaster, 1984, Chernobyl Disaster, 1986, Fukusima Daiichi nuclear disaster, 2011.habitat characterization: ground and remote sensing method.

Details of PhD Coordinator

School Code	School / Institute Name	Name of PhD	Email ID
44	S K Somaiya College (SSBAS)	Dr. Nilesh Wagh	nilesh.wagh@somaiya.edu
Common Email ID			svu.phdcoordinators@somaiya.edu