SDG 15: LIFE ON LAND

SDG 15 emphasizes life on land and ecosystem protection. Integrating this SDG builds awareness of biodiversity conservation and land management. Students understand sustainable environmental practices. This supports ecological balance.



List of Courses mapped to SDG 15:

S.No	Course Title	Name of the Program	Justification for SDG Mapping
1	DISASTER MANAGEMENT	Bachelor of Arts	Covers hazard and risk management, including land degradation and ecosystem vulnerability.
2	SOIL FERTILITY MANAGEMENT	B.Sc. (Honors) Agriculture	Teaches sustainable soil nutrient management that prevents land degradation.
3	SOLID WASTE MANAGEMENT AND LANDFILLS	M.Tech. - Geotechnical Engg	Covers safe waste disposal and landfill design that prevent soil and land contamination.
4	URBAN TRANSPORTATION SYSTEMS PLANNING	B.Tech. - Civil Engineering	Addresses land-use and environmental impacts of transport planning on land and habitats.
5	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES	M.Tech. - Structural Engineering	Teaches resilient structural design that reduces seismic damage to land, settlements and the environment.
6	INSIGHTS TO SUSTAINABLE DEVELOPMENT GOALS	All B.Tech Programs	Module 4 covers Life on Land and ecosystems, and Module 1 introduces planetary boundaries and sustainability trade-offs.

Course Outcomes and Syllabus

Disaster Management

SDG 15

Course code: 22GN3102 | L-T-P-S: 2-0-0-0 | Credits: 3 | Programme: Bachelor of Arts

CO	Course Outcome	PO / PSO	BTL
CO1	To make the students understand the basic concepts related to Internal security	PO1	2
CO2	To make the students understand the security challenges and management	PO2	2
CO3	To make the students understand the basic concepts of terrorism, Money laundering and crimes	PO1	2
CO4	To make the students to know about cyber crimes and key issues	PO 2	2

Syllabus

Understanding Man-Made Disasters - Nuclear Disasters - Chemical Disasters - Biological Disasters -; and Fire – Types of Fire - Air Pollution - Water Pollution - Deforestation - Industrial Pollution - Ozone Depletion. Road Accidents - Rail Accidents - Air Accidents - Sea Accidents – Biological Warfare – Ministry of Environment and Forest (MOEF) role in Management of Disasters. Disaster Response Plan - Needs and Damage Assessment - Role of Central, State, District, and Local Administration in Disaster Response – Role of Armed Forces- Police and Other Forces in Disaster Response - Psychological Response - Trauma and Stress Management - Rumour and Panic Management - Minimum Standards of Relief - National Policy and Plan for Capacity Building - Disaster Management Act 2005. UN World Conference on Disaster Risk Reduction– Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR) – National Institute of Disaster Management (NIDM) - The United Nations International Strategy for Disaster Reduction (UNISDR).

Soil Fertility Management

SDG 15

Course code: 22SSAC221 | L-T-P-S: 2-0-3-0 | Credits: 3 | Programme: B.Sc. (Honors) Agriculture

CO	Course Outcome	PO / PSO	BTL
CO 1	Introduction - Scientists responsible for the essentiality of nutrients - Essential nutrients – Deficiency symptoms of nutrients -Nitrogen - Leaching losses of nitrate nitrogen – Phosphorus – Potassium	PO1, 2	3
CO 2	Calcium - Sulphur - Micronutrient - Zn and Mn - Fe and Cu - Boron and Molybdenum - Chlorine - Soil fertility Evaluation	PO2,4	3
CO 3	Plant analysis – Soil test based fertilizers recommendation - Nutrient use efficiency - Methods of application of nutrients under rainfed and irrigated conditions - Introduction and importance of organic manures - Bulky organic manures – Compost and composting – Methods of preparation of rural and urban compost.	PO2, 4	3
CO 4	Green manures –Definitions of penning, sewage, sewerage, sullage, pouderette, Activated compost process - Chemical fertilizers – Phosphatic fertilizers – Secondary and micronutrient fertilizers – Amendments - Mixed fertilizers – Fertilizer Control Order (FCO)	PO2, 4	3
CO 5	Acquaint with the analytical instruments and recording the observations from the soil samples and plant samples and also about the estimation and identification of different nutrients.	PO8,1,2,4	4

Syllabus

Theory: Introduction, traditional concepts and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Integrated nutrient management.Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, Nano fertilizers, Soil amendments, Fertilizer Storage, Fertilizer Control Order. History of soil fertility and plant nutrition. Criteria of essentiality. role, deficiency and toxicity symptoms of essential plant nutrients. Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rain fed and irrigated conditions. Practical: Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of available N in soils. Estimation of available P in soils. Estimation of available K in soils. Estimation of available S in soils. Estimation of available Zn in soils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of S in plants. Determination of N, P and K in fertilizers, Identification of fertilizer radicals, Nitrogen estimation in organic manure.

Solid Waste Management and Landfills

SDG 15

Course code: 22CE3233 | L-T-P-S: 3-0-0-0 | Credits: 3 | Programme: M.Tech. - Geotechnical Engg

CO	Course Outcome	PO / PSO	BTL
CO1	Understand the sources, types and Properties of solid wastes	PO3	2
CO2	Understand the Current Scenario and Challenges Engineered Systems for Solid Waste Management:	PO3	2
CO3	Understand the Conversion of Solid wastes and Recovery	PO3	2
CO4	Understand the Land Filling of Municipal Solid Wastes and MoEF rules, CPCB guidelines for hazardous waste land filling.	PO3	2

Syllabus

Municipal Solid Wastes: Types of solid wastes, Sources of Municipal and Hazardous wastes, Properties of solid wastes-Physical and Chemical composition. Solid Waste Management: An Overview, Introduction – Reduction, Reuse and Recovery, Waste Disposal Options, Current Scenario and Challenges Engineered Systems For Solid Waste Management: Functional Elements, Solid waste generation, On-site handling, Storage and Processing, Collection of solid wastes, Transfer and Transport, Processing of Solid wastes, Ultimate disposal. Conversion of Solid wastes and Recovery: Mechanical processing and Material recovery systems. Biological Conversion- Composting, Anaerobic Digestion. Thermal Conversion- Combustion, Incineration, Gasification, Pyrolysis, Refuse Derived Fuel, Energy recovery systems. Landfills for Municipal Solid Wastes: Land Filling of Municipal Solid Wastes, Site selection, Planning, Design and Operation. Landfill Gas-composition, Collection. Lechate- environmental effects, Lechate collection systems, Treatment of lechate, MoEF rules, CPCB guidelines for hazardous waste land filling.

Urban Transportation Systems Planning

SDG 15

Course code: 22CE4145 | L-T-P-S: 3-0-0-0 | Credits: 3 | Programme: B.Tech. - Civil Engineering

CO	Course Outcome	PO / PSO	BTL
CO1	Understand the role, purpose of urban transportation planning and systems.	PO1	1
CO2	Estimate the Trip generation and distribution concepts model	PO1,PO5	2
CO3	Understand the concepts of Modal split and traffic assignments.	PO1	1
CO4	Gain knowledge about the concepts of public transport planning and Intelligent Transportation Systems	PO1	1

Syllabus

Transportation Planning: Introduction to transportation planning; systems approach to transportation planning; types of models; concept of travel demand and supply; socio- economic, land use, network, and transport system characteristics affecting transportation planning. Transportation Survey: Study area definition, zoning principles, cordon and screen lines, data collection through primary and secondary sources, sampling techniques. Sequential modeling approach: Four-stage sequential modeling approach; trip generation; trip distribution; modal split; trip assignment. Planning For Public Transport: Public transport planning, Fares and Subsidies Introduction to Intermediate Public Transport Type and Characteristics of IPT Modes in India, Integration of different modes. Urban and intelligent transportation systems: ITS, first generation of ITS and it's applications, ITS in Various Countries, Mature ITS Applications, Safety and Liability, Second Generation of ITS

Earthquake Resistant Design of Structures

SDG 15

Course code: 22CE5208 | L-T-P-S: 3-0-2-0 | Credits: 4 | Programme: M.Tech. - Structural Engineering

CO	Course Outcome	PO / PSO	BTL
CO1	Understand the building categories, seismic behavior and dynamics of structures earthquake causes, ground motion behavior, Seismic resistant building architecture	PO1	2
CO2	Analyze of single degree of freedom and Compute equivalent lateral seismic loads and carryout a seismic design as per IS codal provisions	PO2, PO4	4
CO3	Assessment of ductile Members and design for earthquake loads. Design the 2 storey building with Linear static analysis and non linear dynamic analysis	PO2, PO4	4
CO4	Analyze the concept of base Isolation and design principles	PO2, PO4	4
CO5	ETABS software to develop the models, analyze and design the structures under linear and non-linear static and dynamic conditions	PO4	4

Syllabus

Seismic-resistant buildings: Introduction; Lateral load resisting systems- moment resisting frame, building with shear wall or bearing wall system, building with dual system; Building configuration – Problems and solutions; Building characteristics – Mode shape and fundamental period, building frequency and ground period, damping, ductility, seismic weight, hyper stativity/redundancy. Design forces for buildings: Introduction, Equivalent static method; Mode superposition technique; Dynamic inelastic-time history analysis; Response Spectrum Analysis, Pushover analysis, advantages and disadvantages of these methods; Determination of lateral forces on an intermediate plane frame using Equivalent static method and Model analysis using response spectrum; Analysis of the intermediate frame for various load combinations as per IS1893(Part 1); Identification of design forces and moments in the members. Ductility considerations in earthquake resistant design of RCC buildings: Introduction; Impact of ductility; Requirements for ductility; Assessment of ductility– Member/element ductility, Structural ductility; Factor affecting ductility; Ductility factors; Ductility considerations as per IS13920. Design and detailing of typical flexural member, typical column as per IS13920. Shear Wall Design: Introduction to Shear Walls, Types of shear walls, Design of shear wall for a Lateral Load resisting frame, Design of shear wall for multi storied structure. Base isolation of structures: Introduction; Considerations for seismic isolation; Basic elements of seismic isolation; seismic-isolation design principle; Feasibility of seismic isolation; Seismic-isolation configurations.

Insights to Sustainable Development Goals

SDG 15

Course code: 25UC0032E | L-T-P-S: 2-0-0-0 | Credits: 0 | Programme: All B.Tech Programs

CO	Course Outcome	PO / PSO	BTL
CO1	Understand sustainable development — concept, pillars, and the road to the SDGs.	PO6, PO7, PSO1	2
CO2	Understand the 17 SDGs, their targets, and their interlinkages.	PO6, PO7, PSO1	2
CO3	Analyze the people-and-prosperity SDGs in the Indian and global context.	PO6, PO7, PSO2	4
CO4	Analyze the planet SDGs — climate, energy, water, and ecosystems.	PO6, PO7, PSO2	4
CO5	Apply SDG measurement, governance, and localisation.	PO7, PO11, PSO2	3
CO6	Analyze how technology, AI, and innovation can accelerate the SDGs.	PO5, PO7, PSO2	4

Syllabus

Module 1: Foundations of Sustainable Development. Topics: What sustainable development means; The Brundtland definition; The three pillars - economic, social, environmental; Planetary boundaries; From MDGs to SDGs; The 2030 Agenda and 'leave no one behind'; Sustainability vs growth debates; India's sustainability context. Labs: Map a real project against the three pillars of sustainability; Footprint lab: estimate and reduce a sustainability footprint. Case Study: a development-vs-environment trade-off (e.g., a dam/infrastructure project): analyse how the three pillars of sustainability were balanced or violated.

Module 2: The 17 SDGs Overview. Topics: Overview of all 17 goals; Targets and indicators; The SDG 'wedding cake' model; Interlinkages and trade-offs among goals; Synergies across goals; 'Leave no one behind'; The global indicator framework; Tracking progress. Labs: Build an SDG interlinkage map for a chosen development problem; Indicator lab: interpret SDG progress data for a country/state. Case Study: SDG interlinkages in practice (e.g., clean energy enabling health and education): analyse how progress on one goal advances others.

Module 3: People & Prosperity SDGs. Topics: No poverty and zero hunger; Good health and well-being; Quality education; Gender equality; Decent work and economic growth; Reduced inequalities; Industry, innovation, and infrastructure; India's progress on people/prosperity goals. Labs: Analyse a region's people/prosperity indicators and gaps; Design an intervention targeting a people/prosperity SDG. Case Study: an Indian social initiative (e.g., a health/education/livelihood program): analyse its SDG contribution and outcomes.

Module 4: Planet SDGs. Topics: Clean water and sanitation; Affordable and clean energy; Climate action; Life below water; Life on land; Sustainable cities and communities; Responsible consumption and production; Circular economy. Labs: Audit a setting for responsible consumption and propose circular fixes; Design a planet-SDG (energy/water/waste) solution for a community. Case Study: a clean-energy or water initiative in India (e.g., solar mission / river rejuvenation): analyse its planet-SDG impact and scalability.

Module 5: Partnership, Governance & Measurement. Topics: Peace, justice, and strong institutions (SDG16); Partnerships for the goals (SDG17); Financing the SDGs; Indicators and the SDG India Index; Localising the SDGs; Voluntary National Reviews; Role of governments, business, and civil society; Accountability and reporting. Labs: Build an SDG scorecard for an organisation/community; Design a multi-stakeholder partnership for an SDG target. Case Study: the SDG India Index / a state's SDG localisation: analyse how SDGs are measured and localised, and what drives improvement.

Module 6: Technology, AI & Innovation for the SDGs. Topics: Technology as an SDG accelerator; AI for good - use cases across goals; Social entrepreneurship and impact ventures; Frugal and inclusive innovation; Digital public infrastructure for development; Measuring impact (theory of change); The engineer's and youth's role; Designing an SDG-aligned solution. Labs: Design a technology/AI-enabled solution mapped to an SDG with a theory of change; Pitch a social-impact venture targeting one or more SDGs. Case Study: AI/technology for an SDG (e.g., AI in healthcare access or precision agriculture): analyse how technology accelerates a specific goal, with its risks.