SDG 12: RESPONSIBLE CONSUMPTION AND PRODUCTION

SDG 12 focuses on responsible consumption and production. Curriculum integration encourages sustainable resource use and waste reduction. Students analyze production systems and consumer behavior. This supports environmental responsibility.



List of Courses mapped to SDG 12:

S.No	Course Title	Name of the Program	Justification for SDG Mapping
1	CROP IMPROVEMENT - I & II	B.Sc. (Honors) Agriculture	Covers breeding of resource-efficient, high-yielding crop varieties for sustainable production.
2	FARMING SYSTEMS AND SUSTAINABLE AGRICULTURE	B.Sc. (Honors) Agriculture	Teaches resource-efficient, low-input farming that sustains productivity and the environment.
3	DOWNSTREAM PROCESSING	B.Tech. - Biotechnology	Covers efficient product recovery and purification, reducing waste in bioprocess production.
4	ENVIRONMENTAL IMPACT ASSESSMENT AND LIFE CYCLE ANALYSES	B.Tech. - Civil Engineering	Teaches assessment of resource use and environmental impacts across a product or project life cycle.
5	INSIGHTS TO SUSTAINABLE DEVELOPMENT GOALS	All B.Tech Programs	Module 4 covers Responsible Consumption and Production and the circular economy, including a lab on auditing a setting and proposing circular fixes.

Course Outcomes and Syllabus

Crop Improvement - I (Cereals, Millets, Pulses and Oilseeds)

SDG 12

Course code: 22GPBR 311 | L-T-P-S: 1-0-3-0 | Credits: 2 | Programme: B.Sc. (Honors) Agriculture

CO	Course Outcome	PO / PSO	BTL
CO1	Introduction – General Breeding Objectives – Concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops - Breeding populationsrelevance in crop improvement. Cereals – Rice, Wheat, Barley, Millets- Sorghum and pearlmillet- Origin – Distribution of species – Wild relatives and forms –Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids-Accomplishments.	PO1,2,4	3
CO2	Millets - Finger millet, Kodo millet and Proso millet, Pulses – Chickpea, Pigeonpea, Urd bean and Mung bean - Origin – Distribution of species – Wild relatives and forms –Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids-Accomplishments.	PO2,3,4	3
CO3	Pulses – Soybean, Cowpea, Horsegram, Field pea, Lentil, Oil seeds- Groundnut, Castor and Sesame- Origin – Distribution of species – Wild relatives and forms –Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids - Accomplishments.	PO2,3,4	3
CO4	Oilseeds – Sunflower, Safflower, Rapeseed, Mustard, Lineseed, Niger, Coconut and Oilpalm - Origin – Distribution of species – Wild relatives and forms – Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids – Accomplishments.	PO2,3,4	3
CO5	Emasculation and hybridization techniques in different crop species; cereals, millets, pulses and oilseeds. Maintenance breeding of different crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.	PO3, 4,5, 11	4

Syllabus

Theory Centers of origin, distribution of species, wild relatives in different cereals, pulses, oilseeds; Plant genetic resources, its utilization and conservation; Floral biology; study of genetics of qualitative and quantitative characters; Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops; Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); Ideotype concept and climate resilient crop varieties for future. Practical Emasculation and hybridization techniques in different crop species; cereals, millets, pulses and oilseeds. Maintenance breeding of different crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

Crop Improvement-II (Fiber, Sugar, Starches, Narcotics, Vegetables, Fruits and Flowers)

SDG 12

Course code: 22GPBR 312 | L-T-P-S: 1-0-3-0 | Credits: 2 | Programme: B.Sc. (Honors) Agriculture

CO	Course Outcome	PO / PSO	BTL
CO1	Introduction – General breeding objectives – Concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops - Breeding populationsrelevance in crop improvement. Fibres - Cotton and Jute, Sugars and Starch- Sugarcane, Potato and Sweet potato- Origin – Distribution of species – Wild relatives and forms –Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids - Accomplishments.	PO1,2,4	3
CO2	Narcotics – Tobacco, Vegetables – Tomato, Brinjal, Chilli, Okra, Cucumber, Cabbage and Cauliflower - Origin – Distribution of species – Wild relatives and forms – breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids –Accomplishments.	PO2,3,4	3

CO	Course Outcome	PO / PSO	BTL
CO3	Vegetables – Garlic, Onion, Gourds and Melons, Fruit Crops Banan, Guvava, Mango and Papaya - Origin – Distribution of species – Wild relatives and forms –Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids - Accomplishments.	PO2,3,4	3
CO4	Fruit crops - Lime , Lemons, Apple, pomegranate, Sapota, Flower Crops Rose, Jasmine, Chrysanthemum and Marigold - Origin – Distribution of species – Wild relatives and forms –Breeding objectives – Major breeding procedures (conventional and modern innovative approaches) for development of hybrids / varieties - Seed production technology of varieties and hybrids - Accomplishments. 16 Flower crops -	PO2,3,4	3
CO5	Emasculation and hybridization techniques in fibres, sugars, starches, narcotics, vegetables, fruits and flower crops; maintenance breeding of different crops, Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of quality characters, study of donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.	PO3,4,5, 11	4

Syllabus

Theory Centers of origin, distribution of species, wild relatives in different fibres, sugars, starches, narcotics, vegetables, fruits and flower crops. Plant genetic resources, its utilization and conservation; Floral biology; study of genetics of qualitative and quantitative characters; Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops; Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); Ideotype concept and climate resilient crop varieties for future. Practical Emasculation and hybridization techniques in fibres, sugars, starches, narcotics, vegetables, fruits and flower crops;maintenance breeding of different crops,Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of quality characters, study of donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

Farming Systems and Sustainable Agriculture

SDG 12

Course code: 22AGRO203 | L-T-P-S: 1-0-0-0 | Credits: 1 | Programme: B.Sc. (Honors) Agriculture

CO	Course Outcome	PO / PSO	BTL
CO1	Apply major aspects of agricultural practices and traditions through time and throughout the world.	PO4,6	3
CO2	Illustrate with gaining knowledge about general relationships among culture, economics, politics, science, and agricultural development.	PO4,6	3
CO3	Apply various enterprises including farming system. Students studied types of farming, crop rotation and other practices of field.	PO4,6	3
CO4	Apply to show how agricultural scientists are attempting to minimize agricultural pollution and sustain food production adequate for the world's population	PO4,6	3

Syllabus

Farming system-scope, importance, and concept; Types and systems of farming system and factors affecting types of farming; Farming system components and their maintenance; Cropping system and pattern, multiple cropping system, efficient cropping system and their evaluation; Allied enterprises and their importance, tools for determining production and efficiencies in cropping and farming system; Sustainable agriculture, problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability; Integrated farming system, historical background, objectives and characteristics, components of IFS and its advantages, site specific development of IFS model for different agro-climatic zones; Resource use efficiency and optimization techniques, resource cycling and flow of energy in different farming system, farming system and environment; Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

Downstream Processing

SDG 12

Course code: 22BT3212 | L-T-P-S: 3-0-2-0 | Credits: 4 | Programme: B.Tech. - Biotechnology

CO	Course Outcome	PO / PSO	BTL
CO1	Acquire the knowledge of primary separation and recovery processes	PO1, PO2/ PSO1	2
CO2	Apply the principles of solid removal unit operations and product enrichment operations	PO1, PO2/PSO1	3
CO3	Apply the principles of aqueous two-phase extraction process and product purification methods	PO2, PO5/ PSO2	3
CO4	Analyze the methods of alternative separation, product polishing and formulations	PO1, PO5/ PSO2	4

CO	Course Outcome	PO / PSO	BTL
CO5	Evaluate the bioseparation methods for recovery, isolation and purification of various bioproducts	PO4,PSO1, PSO2	5

Syllabus

Down Stream Processing in Biotechnology; Overview of Bioseparations, Characterization of Biomolecules and bioprocess, characterization of fermentation broth: Morphology of cells, structure of the cell wall. Primary Separation And Recovery Processes Recovery of intracellular products: Cell disruption methods-physical methods (osmotic shock, grinding with abrasives, solid shear, liquid shear) – chemical methods (alkali, detergents)- enzymatic methods. Removal of suspended solids: Foam separation, filtration. Filtration equipment, centrifugation, centrifugation equipment tubular bowl centrifuge, disk. Bowl centrifuge, basket centrifuge. Membrane based separations – Classification & characteristics of membrane separation, merits & demerits. Micro filtration, ultra- filtration, Reverse osmosis, dialysis & electro dialysis. Membrane modules: Plate & Frame, hollow fiber, spiral wound, shell & tube.Product Enrichment Operations: Aqueous two-phase extraction process: Applications of aqueous two-phase extraction, reversed micelles extraction principle, reversed micellar extraction principle, micelle structures, critical micelle concentration. Protein solubilization, limitation of reversed micelles. Precipitations of proteins with salts and organic solvents, kinetics of protein aggregation. Product Purification Chromatographic Separations: Classification of chromatographic techniques, column chromatography, Chromatographic terminology. Principles & practices of Gel Filtration, Ion Exchange and Affinity chromatography. Alternative Separation Methods and Product Polishing; Super critical extraction: principles of SCE, Flow scheme of a simple SCE system. Formulation strategies: Importance of formulation, formulation of beakers yeast, Enzymes, formulation of pharmaceutical products. Polishing: Crystallization, Principles of crystallization and equipment. Principles of drying and lyophilization, Freeze dryer.

Environmental Impact Assessment and Life Cycle Analyses

SDG 12

Course code: 22CE3223 | L-T-P-S: 3-0-0-0 | Credits: 3 | Programme: B.Tech. - Civil Engineering

CO	Course Outcome	PO / PSO	BTL
CO1	Knowledge of Environmental Technology	3	2
CO2	To attain assessment of Impacts of Development activities	3	2
CO3	To attain Environmental Impact assessment on water and air	3	2
CO4	To know the preparation of Environmental Audit Report	3	2

Syllabus

Introduction: Basic Concept of EIA – Initial Environmental Examination (IEE) and Environmental Impact Assessment – Initial Environmental examination (IEE) – Important Steps in EIA – Systematic Approach forusing EIA as a Planning Tool for Major Project Activities. EIA Methodologies: Introduction – Criteria for the Selection of EIA Methodology – EIA Methods – Ad-hoc Methods – Matrix Methods – Network Methods – Overlay Methods – Cost / Benefit Analysis. Assessment of Impact of Developmental activities and Land Use: Methodology for the Assessment of Soiland Groundwater – Delineation of Study Area – Identification of Activities – Description of Existing Soil / Groundwater Resources Soil Characteristics- Procurement of Relevant Soil Quantity – Assessment of Impact Significance. Environmental Impact Assessment on Water and Air: Introduction – Projects which Crate Impact Concerns for the Surface Water Environment – Systematic Methods for Evaluation of Impact of Various Developmental Activities on surface water Environment – Identification of Surface Water Quality or Quality Impacts- Description of Existing Surface Water Resources Conditions – Procurement of Relevant Surface Water Quality – Impact Prediction – Interpretation of Impact Significance. Prediction and Assessment of Impacts on the Air Environment – Basic Information on Air Pollution–Air Pollution Sources – A Generalized Approach for Assessment of Air Pollution Impact. Environmental Audit: Objectives of Environmental Audit – Advantages of Environmental Audit – Waste Audit – Energy Audit – Compliance Audit –A Management Audit - Audit Protocol - Audit Procedure. Stages of Environmental Audit – Program Planning – On Site Activities – Evaluation of Audit Data and Preparation of Audit Report.

Insights to Sustainable Development Goals

SDG 12

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.