SDG 14: LIFE BELOW WATER

SDG 14 focuses on life below water and marine conservation. Curriculum integration promotes awareness of aquatic ecosystems and biodiversity. Students analyze marine sustainability challenges. This supports ocean conservation.



List of Courses mapped to SDG 14:

S.No	Course Title	Name of the Program	Justification for SDG Mapping
1	SOIL AND WATER CONSERVATION ENGINEERING	B.Sc. (Honors) Agriculture	Covers erosion and runoff control that reduce sediment and pollutant flow into rivers and coastal waters.
2	PROCESSING OF AQUATIC FOODS	B.Sc.(Food Technology)	Covers handling and processing of fish and aquatic produce, supporting responsible use of aquatic resources.
3	INSIGHTS TO SUSTAINABLE DEVELOPMENT GOALS	All B.Tech Programs	Module 4 covers Life Below Water alongside water and ecosystem sustainability, with planet-SDG case studies and design labs.

Course Outcomes and Syllabus

Soil and Water Conservation Engineering

SDG 14

Course code: 22AENG151 | L-T-P-S: 1-0-3-0 | Credits: 2 | Programme: B.Sc. (Honors) Agriculture

CO	Course Outcome	PO / PSO	BTL
CO 1	Understand the concepts of soil, water, and wind erosion along with their various conservation practices.	PO1,4	3
CO 2	Comprehend about terraces, contours, and grasses waterways in order to prevent erosion at different grades of slopy land	PO2,7	3
CO 3	Characterize the concepts of irrigation water measurement and various irrigation methods - micro-irrigation, underground pipeline system.	PO1,4	3
CO 4	Understand the water conservation structure, and the systems associated with wells to drive water out of them to irrigate the agricultural land	PO1,5	3
CO 5	Apply the solutions to the real-life problems through laboratories' work.	PO1,4,8	4

Syllabus

Introduction to soil and water conservation - Causes of soil erosion - Definition and agents of soil erosion - Water erosion - Forms of water erosion - Gully classification and control measures - Soil loss estimation by Universal Soil Loss Equation - Soil loss measurement techniques - Principles of erosion control - Introduction to contouring Strip cropping - Contour bund - Graded bund and bench terracing - Grassed water ways and their design - Water harvesting and its techniques - Wind erosion - Mechanics of wind erosion - Types of soil movement - Principles of wind erosion control and its control measures. Introduction to irrigation - Irrigation project classification - Methods of microirrigation - Importance of irrigation water measurements – Volumetric area velocity Discharge methods - Weirs – Orifice – Flumes - Types of wells - Water lifting devices Classification of pumps – capacity – Power - Discharge calculations - Open channel hydraulics - Discharge calculations - Underground pipeline systems - Functional components of micro irrigation systems and its design like drip - Sprinkler etc. - Water harvesting - Lining of ponds – Tanks - Canals.

Processing of Aquatic Foods

SDG 14

Course code: 22FT22C3 | L-T-P-S: 3-0-2-0 | Credits: 4 | Programme: B.Sc.(Food Technology)

CO	Course Outcome	PO / PSO	BTL
CO1	To get acquainted with commercially important animals and plants used as food sources and their body structures.	PO 1, 5,7 PSO 1	2
CO2	To learn about edible and non-edible parts of aquatic animals and plants and nutritional attributes.	PO 1, 5,7 PSO 1	3
CO3	To understand processing, preservation, supply chain, and marketing aspects of such products.	PO 1, 5,7 PSO 1	3
CO4	To be able to execute preservation of select marine products.	PO 1, 5,7 PSO 1	3
CO5	To be able to analyze physico-chemical properties of raw aquatic animals and plants.	PO 1, 5,7 PSO 1	4

Syllabus

Module 1: Introduction – Overview of the aquatic animal industry, commercial importance, definitions, classification, glossary. Aquatic food sources – Various animals marketed in the aquatic (freshwater and seawater) food industry: fish of different kinds, crustaceans (crabs, shrimps, etc.), cephalopods (octopus, squid), mollusks (clamps, sea snails, etc.); Plants: seaweed, water spinach; external anatomy, edible and non-edible parts, nutritional attributes, and nutritional advantages versus regular plant sources.

Module 2: Spoilage – Extrinsic factors (temperature, moisture, microbes, insects), intrinsic factors (physical, chemical, biochemical, physiological).

Module 3: Processing technology – Drying: sun drying, microwave drying, ohmic heating, IR heating, ultrasound processing, enzymatic processing; salting, canning or heat processing, freezing, smoking, high pressure processing (HPP), retort, pulsed light, irradiation, electromagnetic field, etc.; cold storage, refrigerated vans for transport.

Module 4: Fish byproducts – Fish liver oil, fish body oil, fish meal, fish manure, fish flour, fish silage, fish soluble, fish sausage, fish macaroni, fish biscuits, fish glue, gelatin, albumin, fish protein concentrate, fish cutlets, fish fingers. Quality attributes – Nutritional value. Sensory: appearance, color, flavor, odor, and texture.

Module 5: Practical: 1. Analyzing physico-chemical properties of select raw aquatic animals. 2. Analyzing physico-chemical properties of select raw aquatic plants. 3. Analyzing nutritional properties of select raw aquatic animals. 4. Analyzing nutritional properties of select raw aquatic plants. 5. Analyzing physico-chemical properties of select aquatic animals. 6. Prepare fish pickle and test it for physico-chemical and nutritional properties.

Insights to Sustainable Development Goals

SDG 14

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.