

**ST.JOSEPH'S COLLEGE(AUTONOMOUS)
BENGALURU-27**



Re-accredited with 'A++' GRADE with 3.79/4 CGPA by NAAC
Recognized by UGC as College of Excellence

As per NEP Format

DEPARTMENT OF ENVIRONMENTAL SCIENCE

SYLLABUS FOR UNDERGRADUATE PROGRAMME

For Batch 2021 Onwards

Part A			
1	Title of the Academic Program	B.Sc. Chemistry, Environmental Science, Zoology Chemistry, Environmental Science, Botany	
2	Program Code	SJC B.Sc.CEB and CEZ	
3	Name of the College	St. Joseph's College (Autonomous)	
4	Objective of the College	<ol style="list-style-type: none"> 1. Academic Excellence 2. Character Formation 3. Social Concern 4. Environmental Concern 	
5	Vision of the College	"Striving for a just, secular, democratic and economically sound society, which cares for the poor, the oppressed and the marginalized"	
6	Mission of the College	M 1	St. Joseph's College (Autonomous) seeks to form men and women who will be agents of change, committed to the creation of a society that is just, secular and democratic.
		M 2	The education offered is oriented towards enabling students to strive for both academic and human excellence.
		M 3	The college pursues academic excellence by providing a learning environment that constantly challenges the students and supports the ethical pursuit of intellectual curiosity and ceaseless enquiry.
		M 4	Human excellence is promoted through courses and activities that help students achieve personal integrity and conscientise them to the injustice prevalent in society.
7	Name of the Degree	Bachelor of Science (B.Sc.,)	
8	Name of the Department offering the program	Environmental Science	
9	Vision of the Program	Empowering and emancipating students through an understanding of the environment, sustainability and related ethical issues.	
10	Mission of the	Our mission is to develop environmentally conscious citizens who are able to appreciate the environment in its totality. We strive to equip our students with motivation, attitude, sound knowledge, commitment and skills to actively	

	Program	participate, at various levels, in sustainably managing environmental issues.	
1 1	Duratio n of the Program	4 years (Eight semesters with an exit option after each even semester)	
1 2	Total No. of Credits	184	
1 3	Progra m Educat ional Objecti ves (PEOs)	PEO 1	
		PEO2	Will be provided after an inter-departmental meeting
		PEO 3	
1 4	Graduation Attributes	<p>The Following graduate attributes reflect the particular quality and feature or characteristics of an individual, that are expected to be acquired by a graduate through studies at St. Joseph’s College.</p> <ul style="list-style-type: none"> • Disciplinary knowledge • Communication Skills • Critical thinking • Problem solving • Analytical reasoning • Research-related skills • Cooperation/Team work • Reflective thinking • Information/digital literacy • Self-directed learning and Lifelong learner • Multicultural competence • Moral and ethical awareness/reasoning • Leadership readiness/qualities • International Outlook 	
1 5	Program Outcomes (POs)	PO1	
		PO2	Will be provided after an inter-departmental meeting
		PO3	
		PO4	
<p>Programme Outcomes: POs are statements that describe what the students graduating from any of the educational Programmes should be able to do (To be Prepared in consultation with other departments (Languages and Optional subjects. 4-10 POs can be written</p> <ul style="list-style-type: none"> • Guidelines for the POs <ul style="list-style-type: none"> – Program outcomes basically describe knowledge, skills and behavior of 			

<p>students as they progress through the program as well as by the time of graduation.</p> <ul style="list-style-type: none"> - POs should not be too broad - They must be aligned with the Graduation Attributes 			
1 6	Program Specific Outcomes (PSOs)	ES 121	To develop competency in understanding the interrelatedness of the division of the Environment.
			To instill an introductory knowledge of the divisions of Environment and develop necessary analytical skills to characterise their variations.
		ES 1P1	To motivate and inspire to acquire contemporary understanding and skills leading to issue identification.
			To inculcate creativity and innovative spirit in the domain of human-environment interface leading to vocation/entrepreneurial opportunities.
		ES 221	To develop competency in understanding the ecological principles governing the biosphere.
			To instill a knowledge of the Ecology and develop necessary analytical skills to understand the ecological systems.
		ES 2P1	To motivate and inspire to acquire contemporary understanding and skills leading to issue identification.
			To inculcate creativity and innovative spirit in the domain of human-environment interface leading to vocation/entrepreneurial opportunities.

Part B

B.Sc. CEB/Z Curriculum

Courses and course completion requirements	No. of credits
General English	
Second language: Introductory Kannada/Kannada/ Hindi/ Sanskrit/ Tamil/ Additional English/French/German.	
Chemistry	
Environmental Science	
Botany / Zoology	
Open elective courses (non-professional)	
Foundation courses	

Term paper	
Soft skills (IGNITORS)	
Human resource development (HRD)/Theology	
Outreach activity	
Extra and Co-curricular activities	

SUMMARY OF CREDITS IN ENVIRONMENTAL SCIENCE

DEPARTMENT OF ENVIRONMENTAL SCIENCE (UG)								
(2021-2024)								
Semester 1	Code Number	Title	No. of Hours of Instructions	Number of Hours of teaching per week	Number of credits	Continuous Internal Assessment (CIA) Marks	End Semester Marks	Total marks
Theory	ES -121	Divisions of the Environment	52	04	04	40	60	100
Practical	ES -1P1	Water Quality Analysis	52	04	02	25	25	50
OE	ESOE-1	Environment and sustainable Agriculture	42	03	03	40	60	100
Total Number of credits:			09					
Semester 2	Code Number	Title	No. of Hours of Instructions	Number of teaching hrs /week	Number of credits	Continuous Internal Assessment (CIA) Marks	End Semester Marks	Total marks
Theory	ES -221	Ecology – Theory and Practice	52	04	04	40	60	100
Practical	ES -2P1	Ecological Methods	52	04	02	25	25	50
OE	ESOE-2	Environment and Public Health in Contemporary Society	42	03	03	40	60	100
Total Number of credits:			09					

CORE COURSES (CC)

Course Title	Code Number
Divisions of the Environment	ES-121
Ecology – Theory and Practice	ES - 221

OPEN ELECTIVE COURSES

Course Title	Code Number
Environment and sustainable Agriculture	ESOE – 1
Environment and Public Health in Contemporary Society	ESOE – 2

SKILL ENHANCEMENT COURSE (SEC) –

Any practical oriented and software-based courses offered by departments to be listed below

Course Title	Code Number
Water Quality Analysis	ES -1P1
Ecological Methods	ES -2P1

Content of Theory Course 1	52 Hrs
-----------------------------------	---------------

SYLLABUS – Theory and Practicals

B.Sc. (Basic/Hons.) Semester 1

Title of the Course: **ES 121-DIVISIONS OF THE ENVIRONMENT**

Number of Theory Credits	Number of lecture hours/semester	Number of Practical Credits	Number of practical hours/semester
4	52	2	52

Programme specific objectives

PSO1	To develop competency in understanding the interrelatedness of the divisions of the Environment.
PSO2	To instill an introductory knowledge of the divisions of Environment and develop necessary analytical skills to characterise their variations.
PSO3	To motivate and inspire to acquire contemporary understanding and skills leading to issue identification.
PSO4	To inculcate creativity and innovative spirit in the domain of human-environment interface leading to vocation/entrepreneurial opportunities.

Programme outcomes

PO1	Demonstrate an entry level competence in understanding the environmental divisions and associated processes.
PO2	Demonstrate the ability to carry out water quality analysis in the laboratory and interpret the results.
PO3	Ability to understand and appreciate the role of environmental parameters in specific day-to-day activities.
PO4	Be able to understand the demands and function in work environment dealing with environmental systems

Unit-1	08
<p>Environmental Education: Definition, Aim, Objectives and Scope.</p> <p>Environmental Science: Definition, Aim of study and Scope. Differences between Ecology and Environmental Science; Various approaches of studying Environmental Science.</p> <p>Components of the Environment: Definitions of Atmosphere, Hydrosphere, Lithosphere and Biosphere - their complex interactions and significance.</p>	
Unit-2	16
<p>Atmosphere: Evolution of the atmosphere – Principal components – Permanent and variable gases. Structure of the atmosphere on the basis of temperature and composition.</p> <p>Ozone chemistry - Depletion and recovery of stratospheric ozone – monitoring, effects and control measures.</p> <p>Climatology: Differences between weather and climate; Insolation - Factors affecting the distribution. Solar (short-wave) and terrestrial (long-wave) radiations. Earth's Albedo and Heat budget of the earth. Tropical monsoon climate – Tropical cyclones and their impacts. Weather forecasting and modification. El-Nino and La-Nina effect.</p> <p>Global warming, effects and control measures; Global dimming - Definition, causes and implications; Urban Heat Islands.</p>	
Unit-3	14

Hydrosphere:Hydrologiccycle-processofheatenergytransfer-Radiation, Conduction and Convection. Types of lifting and precipitation - Bergeronprocess-
Cloudformationandclassification.Formsofcondensation;Forms ofprecipitation;
Cloud burst and flash floods.Cloudseeding.

Limnology:Definition-LoticandLenticenvironment.DifferencesbetweenLotic and Lenticsystems.

Loticenvironment:Springs,Streamprofile:PotomonandRhithron.

Lentic environment: Ponds, lakes and estuaries – their types. Photic andthermalstratificationofLentic systems.

Marine environment: Zonation, Salinity status of marine environment,biotic communities of oceanic zones, acidification of sea water; Coral bleaching; oceancurrentsandtides, coastal upwelling and Red tide-significance;Polymetallicnodules.

Groundwater:Definition.Zonation;Typesofwells.Salinizationofgroundwaterin coastalregions.

Unit-4	14
<p>Lithosphere: Definition. Internal structure of the earth.</p> <p>Endogenic processes: Plate Tectonics–Earthquake and Volcanism– Causes, Effects, and Management.</p> <p>Exogenic processes: River, Sand dunes, Glaciation, Avalanches and Landslides.</p> <p>Mineralogy: Definition. Outline classification of minerals</p> <p>Petrology: Definition. Classification - Igneous, Sedimentary and Metamorphic rocks–their formation–types– uses.</p> <p>Pedology: Soil – definition – formation – soil profile. Types – Alluvial; Black; Red and Laterite; Arid and Desert; Saline and Alkaline; Peaty and Marshy; Grassland, Forest and Mountain Soils. A brief account of Soil biota. Soil weathering and erosion–Types, effects and management.</p>	

References

- Allaby, M. (2002). Basics of Environmental Science. Routledge.
- Barry, G. R. and Chorley, J. R. (2003). Atmosphere, Weather and Climate. Routledge, London.
- Basu M. and Xavier S. (2017). Fundamentals of Environmental Studies. Cambridge University Press.
- Critchfield, H. J. (1995). General Climatology. Prentice Hall of India.
- Horne, A. J., & Goldman, C. R. (1994). Limnology (Vol. 2). New York: McGraw-Hill.
- Lutgens, F. K. and Tarbuck, E. J. (1982). Atmosphere–Introduction to Meteorology. Prentice Hall Inc.
- Manahan, S. E. (2011). Fundamentals of environmental chemistry. CRC press.
- Miller, G. T., & Spoolman, S. (2015). Environmental Science. Cengage Learning.
- Miller, Jr. G. T. (1994). Living in the Environment: Principles, Connections and Solutions. Wadsworth Publishing Co.
- Miller, R. W. and Donahue, R. L. (1992). Soils–Introduction to Soils and Plant Growth. Prentice Hall of India.
- Mitra, A., & Chaudhuri, T. R. (2020). Basics of Environmental Science. New Central Book Agency.
- Nandini, N. (2019). A textbook on Environmental Studies (AECC). Sapna Book House, Bengaluru.

Wright, R. T. (2007). *Environmental science: toward a sustainable future*. Jones & Bartlett Publishers.

Content of Practical Course 1: List of experiments to be conducted

ES1P1: WATER QUALITY ANALYSIS

(Total Teaching Hours=52; Total Credits=2)

1. Sampling technique of water
2. Determination of pH – pH metric method
3. Determination of Electrical Conductance – Conductivity meter method
4. Estimation of Turbidity – Nephelometric method
5. TS, TSS & TDS – Gravimetric and Filtration method
6. Estimation of Acidity – Alkalimetric method / CO₂ – NaOH titration method
7. Estimation of Alkalinity – Acidimetric method
8. Estimation of Hardness – EDTA Complexometric method
9. Estimation of Chlorides – Argentometric method
10. Estimation of Dissolved Oxygen – Modified Winkler's method
11. Estimation of Nitrates – Phenoldisulfonic Acid method
12. Estimation of Fluorides – Fluoridimeter method / SPADNS Reagent method
13. Estimation of Sulphates – Barium chloride method

References

- Nandini, N. (2009). Handbook on water quality monitoring and Assessment. Sapna Book House, Bengaluru.
- Sawyer, C.N. and McCarty, P.L. (1978). Chemistry for Environmental Engineering. Mc Graw-Hill International.
- Saxena MM. (1990). Environmental Analysis: Water, Soil and Air. Edition, 2. Publisher, Agro Botanical Pub.
- Standard Methods for Examination of Water and Wastewater. (2017). APHA – WEF.
- Trivedi, P.K. and Goel, P.K. (1984). Chemical and Biological Methods of Water Pollution Studies. Environmental Publication.
- Zhang, C. (2007). Fundamentals of environmental sampling and analysis. John Wiley & Sons.

**ESOE1:ENVIRONMENTANDSUSTAINABLEAGRICUL
TURE**

NumberofTheoryCredits	Numberoflecturehours/semester
3	42

ContentofOPENELECTIVETheoryCourse1	42Hrs
Unit-1	14
<p>Environment–Definition,scopeandsignificance.</p> <p>Agriculture – Definition, scope and significance. Environmental basis foragricultureandfood.AgriculturalpatternsIndia.Socio-economicpressuresonagriculture. Case study of slash and burn agriculture. Foodsecurityandfoodscarcity. Food wastage- Impact on global warming; UNEP Food Loss Index and Food Waste Index Report.</p> <p>Typesofagriculture–rain-fedcultivationandirrigation–waterintensiveagriculture–Surface water storage systems – farm ponds, tanks, reservoirs; groundwaterexploitation and its effects.Conventionalandmechanisedagriculture. Water management in agriculture – Drip irrigation, micro irrigation, Sprinklers and rain simulators. Irrigation and drainage systems.</p> <p>Naturalandchemicalagriculture.Subsistenceandcommercialagriculture.Environmentaleffectsofanduseandlandscapechanges.</p>	
Unit-2	14
<p>Environmental determinants of agriculture – role of rainfall, humidity,wind,topographyandedaphicfactorsincropselection. Influence of biotic factors on crops – Transboundary Pest attack - Locust migration – micro and macro pests</p>	

<p>Animal husbandry – Dairy and poultry – role of transboundary species of cattle in Indian scenario.</p> <p>Pisciculture–Environmentaleffectsofintensivepisciculture. – Introduction of invasive species – Case study of Cat fish</p> <p>Agriculturalbiodiversity:Cropdiversity–Definitionandsignificance.Poly culture and mono culture. Influences of green revolution on modernagricultural practices of India – Loss of agrobiodiversity – Influence oftransboundary crops. Agricultural biotechnology – Genetically ModifiedCrops– Influenceonenvironment.Pollinationcrisis.Integratedpestmanagement. Measures to conserve Agriculturalbiodiversity – Seed bank of indigenous species, Gene pool, Cryopreservation.</p>	
<p>Unit-3</p>	<p>14</p>
<p>Environmental impacts ofagriculture–Loss of biodiversity–soil salinity – fertiliser and pesticide pollution, Climate change and global warming.Erosion and problems of deposition in irrigation systems. Desertification.Biomagnification–Casestudies.</p> <p>Contemporaryissuesandmanagement–Farmerdistress–marketmechanisms– natural farming methods/organic farming.Urban agricultureandhydroponics. Criteria for organic certification.</p> <p>Ecological principles of farming – Sustainable agriculture– Significanceofindigenousscropsandcattlevarieties.Watershedmanagement.AgriculturalpoliciesofIndia.</p>	

References

- Altieri, M.A. (2018). *Agroecology: the science of sustainable agriculture*. CRC Press.
- Campanhola, C., & Pandey, S. (Eds.). (2018). *Sustainable food and agriculture: An integrated approach*. Academic Press.
- Cohan, R.L. 2001. *The Economics of Agriculture*. Mohit Publications. New Delhi.
- de Zeeuw, H., & Drechsel, P. (Eds.). (2015). *Cities and agriculture: Developing resilient urban food systems*. Routledge.
- Eric Lichtfouse, Mireille Navarrete, Philippe Debaeke, Souchere Veronique, Caroline Alberola. (2009). *Sustainable Agriculture*. Springer Science & Business Media.
- Janarthana Rao, N. 2005. *Indian Agriculture . Issues and Perspectives*. The ICFAI University Press. Hyderabad.
- Kazim B. Rahim Debash Sarkar Bidhan Chand. (2012). *Sustainable Agriculture and Environment*. New Delhi Publishers.
- Lekhi, R.K. and Joginder Singh. 2016. *Agricultural Economics. An Indian Perspective*. Kalyani Publishers, New Delhi.
- Satyanarayana, T., Johri, B. N., & Prakash, A. (Eds.). (2012). *Microorganisms in sustainable agriculture and biotechnology*. Springer Science & Business Media.
- Songstad, D. D., Hatfield, J. L., & Tomes, D. T. (Eds.). (2014). *Convergence of food security, energy security and sustainable agriculture (Vol. 67)*. New York: Springer.

B.Sc.(Basic/Hons.)Semester2

TitleoftheCourse:**ES221-ECOLOGY–THEORYANDPRACTICE**

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours/semester
4	52	2	52

Programmespecificobjectives

PSO1	To develop competency in understanding the ecological principles governing the biosphere.
PSO2	To instill knowledge of the Ecology and develop necessary analytical skills to understand the ecological systems.
PSO3	To motivate and inspire to acquire contemporary understanding and skills leading to issue identification.
PSO4	To inculcate creativity and innovative spirit in the domain of human-environment interface leading to vocation/entrepreneurial opportunities.

Programmeoutcomes

PO1	Demonstrate an entry level competence in understanding the ecological dynamics and their influence on humans and anthropogenic endeavours.
PO2	Demonstrate the ability to carry out ecological analysis in field conditions/laboratories and make appropriate judgements.
PO3	Ability to understand and appreciate the role of ecology and system dynamics in specific habitats/agroecosystems.
PO4	Be able to understand the demands and function in work environment dealing with environmental

	systems.
--	----------

Content of Theory Course 2	52 Hrs
Unit-1	14
<p>Levels of organization, Ecology: Divisions of Ecology – Autecology and Synecology - approaches in studying Ecology.</p> <p>Ecosystems – Definitions. Classification of ecosystems – Terrestrial and Aquatic with their divisions. Structure of the ecosystem- Function of ecosystem- food chain – food web – bio-magnification. Ecological pyramids – Types.</p> <p>Biogeochemical cycles: Classification. Carbon and Phosphorus cycles – anthropogenic influences on these cycles.</p> <p>Energy flow in an ecosystem – productivity-trophic levels – Box and pipe model of energy transfer; Study of pond and cropland ecosystems; Homeostasis - Cybernetics and feedback mechanisms.</p>	
Unit-2	14
<p>Community Ecology: Definition, Characteristics of a Community – Species diversity, growth form and structure, dominance, relative abundance, trophic structure.</p> <p>Population Ecology: Definition, Characteristics of Population: Density – Natality – Mortality – Age distribution – Growth form – Population Equilibrium – Biotic potential – Carrying capacity – Dispersal – Dispersion – Population fluctuations – Population regulation.</p>	
Unit-3	14
<p>Ecological succession – Primary and Secondary succession – Natural and man-influenced succession, – Hydrarch and Xerarch - Climax vegetation and their theories; Ecotone and Edge effect; Ecological equivalents; Ecotypes and Ecophenes; Ecological indicators.</p> <p>Ecological Niche: Concept and Types of niches: Spatial, Trophic and Multidimensional – Niche parameters: Form, Position and Width – Niche Partitioning-</p>	

Realized and Fundamental Niche.	
Biomes: Definition and concept. Classification of biomes.	
Unit-4	14
<p>Biotic and Abiotic factors: Influence of Temperature, Wind and Water, Edaphic, Topographic factors on flora and fauna.</p> <p>Concept of Limiting Factors: Liebig's Law of Minimum; Shelford's Law of Tolerance and the combined concept.</p> <p>Organic evolution: Definition – Darwin's postulates – Natural selection – Types – Industrial Melanism – Pesticide resistance.</p> <p>Co-evolution; Mimicry – Batesian and Mullerian mimicry, warning colouration.</p>	

References

- Agarwal, K. C. (1999). Environmental Biology. AgroBotanica.
- Beck, W. S., Liem, K. F. and Simpson, G. G. (1991). Life–Introduction to Biology. HarperCollins Publications.
- Chapman, J. L. and Reiss, M. J. (1995). Ecology–Principles and Applications. Cambridge University Press.
- Dash, M. C. (2001). Fundamentals of Ecology. Tata McGraw-Hill Publishing Co.
- Kormondy, E. J. (1996). Concepts of Ecology. Prentice Hall of India.
- Mamta Rawat, Sumit Dookia and Chandrakasan Sivaperuman. (2015). Aquatic Ecosystem: Biodiversity, Ecology and Conservation. Springer publication.
- McCleery, Robert A., Moorman, Christopher, Peterson, M. Nils (Eds.). (2014). Urban Wildlife Conservation-Theory and Practice. Springer publication.
- Odum, E. P. (1971). Fundamentals of Ecology. W. B. Saunders Co.
- Raven, P. H. and Johnson, G. B. (1995). Biology. Wm. C. Brown Publications.
- Ricklefs, R. E. and Miller, (1999). Ecology. W. H. Freeman and Co.
- Smith, T. M. and Smith, R. L. (2007). Elements of Ecology. Pearson Education.
- Taylor, T. J., Green, N. P. O. and Stout, G. W. (1998). Biological Science Soper, R. (ed.). Cambridge University Press.
- Wallace, R. A. (1990). Biology–The World of Life. HarperCollins Publications.

Content of Practical Course 2: List of Experiments to be conducted

ES2P1: ECOLOGICAL ANALYSIS

(Total Teaching Hours=52; Total Credits=2)

1. Sampling technique of phytoplankton
2. Sampling technique of zooplankton
3. Quantitative estimation of phytoplankton – Sedgwick-Rafter method
4. Quantitative estimation of zooplankton – Sedgwick-Rafter method
5. Determination of organic pollution – Palmer's Algal Pollution index
6. Estimation of primary productivity of a pond – Light and Dark bottle method
7. Estimation of primary productivity of terrestrial vegetation – Chlorophyll method
8. Estimation of primary productivity of grasses – Harvest method
9. Study of plant community – Individual count method / Quadrat method
10. Study of animal community – Line transect method
11. Determination of species diversity indices – Simpson and Shannon's Wiener Index
12. Estimation of carbon capture and storage of trees
13. Identification of ecological indicators

References

- Michael, P. (1986). *Ecological Methods for Field and Laboratory Investigations*. Tata McGraw-Hill Publishing Co. Ltd.
- Rolan, R.G. (1973). *Laboratory and Field Investigations in General Ecology*. Macmillan Co.
- Standard Method for Examination of Water and Wastewater. (2017). APHA – WEF.
- Subrahmanyam, N.S. and Sambamurty, A.V.S.S. (2000). *Ecology*. Narosa Publishing House.
- Trivedi, P.K. and Goel, P.K. (1984). *Chemical and Biological Methods of Water Pollution Studies*. Environmental Publications.

**ESOE2:ENVIRONMENTANDPUBLICHEALTHINCONTEMPORAR
YSOCIETY**

NumberofTheoryCredits	Numberoflecturehours/semester
3	42

ContentofOPENELECTIVETheoryCourse2	42Hrs
Unit-1	14
<p>Environmentandpublichealth:Definitionsofhealthanddisease.Perspectivesonindividualhealth:Nutritional,socio-culturalanddevelopmentalaspects,Dietarydiversityforgoodhealth;Humandevlopmental indices for public health. Effect of quality of air, water andsoilonhuman health.</p> <p>Diseases in contemporary society: Need for good health - factors affectinghealth.Typesofdiseases-deficiency,infection,pollutiondiseases-allergies, respiratory, cardiovascular and cancer. Personal hygiene- food-balanceddiet.Healtheffectsofsmoking,alcoholconsumption, drug addiction and substance abuse.</p>	
Unit-2	14
<p>Malnutrition:VitamindeficiencydiseasesandMineraldeficiencydiseases;Folic acid requirement during pregnancy; Food Safety- Adulterants andpreservatives;PesticideToxicity:EndosulfanandDDT;GeneticallyModified Food.</p> <p>Non-communicablediseasesandLifestylediseases-DiabetesandHypertension.</p> <p>Communicable diseases: Definition, mode of transmission – pandemic,epidemic and endemic diseases.</p> <p>Vector borne diseases: Plauge and Malaria; emerging diseases: Dengue,Chikungunya, Zika, Ebola, Swine Flu, Bird Flu, Severe Acute</p>	

Respiratory Syndrome (SARS), Covid -19, Middle East Respiratory Syndrome (MERS); Zoonosis- Leptospirosis; Kyasanur Forest Disease (KFD) Toxoplasmosis and Nipah.	
Unit-3	14
Occupational health: Sick Building Syndrome; Noise and Radiation; Ergonomics - Stress and Fatigue; Carpal tunnel syndrome (CTS); Synergistic effect; Irritable Bowel Syndrome; Crohn's disease. Environmental Sanitation and Hygiene: Safe disposal of human excreta; Solid waste disposal; Case study of Bengaluru. Sanitation value chain. Drug safeties: Thalidomide Tragedy; Antibiotic stewardship; New Delhi Antibiotic -Resistant superbug.	

References

- Akhtar, R. (Ed.). (2019). Extreme weather events and human health: International case studies. Springer Nature.
- Bedi and Yashpal. (1971). Handbook of Hygiene and Public Health. Atma Ram & Sons, Delhi.
- Kessel, A. (2006). Air, the environment and public health. Cambridge University Press.
- Lopez, R.P. (2012). The built environment and public health (Vol. 16). John Wiley & Sons.
- Nandini N. (2018). Environment and public Health. Sapna Book House, Bengaluru.
- O'Carroll, P.W., Yasnoff, W.A., Ward, M.E., Ripp, L.H., & Martin, E.L. (Eds.). (2003). Public health informatics and information systems.
- Park, K. (2009). Park's Textbook of Preventive and Social Medicine, 20th Edition. Misc Publication.
- Rajit Sengupta and Kiran Pandey. (2021). State of India's Environment 2021: In Figures. Centre Science and Environment, New Delhi.
- Van den Bosch, M., & Bird, W. (Eds.). (2018). Oxford textbook of nature and public health: The role of nature in improving the health of a population. Oxford University Press.

Walton, M. (2017). *One Planet, One Health*. Sydney University Press.