

Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science & Commerce, Baramati

(Autonomous)

Three/Four Year Honours/Honours with Research B.Sc. Degree

Program in Environmental Science

(Faculty of Science)

CBCS Syllabus

F.Y.B.Sc (Environmental Science)

For Department of Environmental Science

<u>NEP-2.0</u>

Choice Based Credit System Syllabus (2024 Pattern) (As Per NEP-2020)

To be implemented from Academic Year 2024-2025

Title of the Programme: F.Y.B.Sc. (Environmental Science)

Preamble

AES's Tuljaram Chaturchand College has decided to change the syllabus of various faculties from June, 2023 by taking into consideration the guidelines and provisions given in the National Education Policy (NEP), 2020. The NEP envisions making education more holistic and effective and to lay emphasis on the integration of general (academic) education, vocational education and experiential learning. The NEP introduces holistic and multidisciplinary education that would help to develop intellectual, scientific, social, physical, emotional, ethical and moral capacities of the students. The NEP 2020 envisages flexible curricular structures and learning based outcomes for the development of the students. The credit structure and the courses framework provided in the NEP are nationally accepted and internationally comparable.

The rapid changes in science and technology and new approaches in different areas of Geography and related subjects, Board of Studies in Geography of Tuljaram Chaturchand College, Baramati - Pune has prepared the syllabus of FYBA Geography Semester - I under the Choice Based Credit System (CBCS) by following the guidelines of NEP 2020, NCrF, NHEQF, Prof. R.D. Kulkarni's Report, GR of Gov. of Maharashtra dated 20th April, 16th May 2023 and 13th March, 2024 and Circular of SPPU, Pune dated 31st May 2023.

In today's rapidly changing world, a Bachelor's degree in Environmental Science offers ample opportunities for individuals passionate about making a positive impact on the environment and understanding the interrelated systems governing the planet. As the global population surges and natural resources dwindle, the need for professionals skilled in environmental management, conservation, and sustainable development has never been more critical. With a strong foundation in critical thinking, problem-solving, and interdisciplinary understanding, Environmental Science graduates can pursue a wide range of rewarding careers in various sectors.

One of the most prominent careers in this field is that of an Environmental Scientist. This role entails conducting research and analysis to identify, monitor, and mitigate environmental hazards, develop sustainable land, water, and waste management practices, and inform public policy on environmental conservation. Industries such as mining, oil and gas, chemical production, and urban development actively seek Environmental Scientists to ensure compliance with environmental regulations and reduce their ecological footprint. Environmental Consulting is another avenue that combines scientific knowledge and problem-solving abilities to help businesses, nonprofits, and governments develop ecoconscious strategies and innovative solutions to mitigate environmental risks. These consultants play a crucial role in developing and implementing sustainable practices that meet legislative and social expectations. Environmental education and awareness are now more significant than ever. Environmental Science graduates can contribute as educators in schools, colleges, and community organizations, creating environmentally literate citizens that can make informed decisions about the planet's future.

Overall, revising the Environmental Science syllabus in accordance with the NEP 2020 ensures that students receive an education that is relevant, comprehensive, and prepares them to navigate the dynamic and interconnected world of today. It equips them with the knowledge, skills, and competencies needed to contribute meaningfully to society and pursue their academic and professional goals in a rapidly changing global landscape.

Programme Specific Outcomes (PSOs)

PSO1. Critical Thinking- Students will demonstrate an understand major concepts of Environment in association with multidisciplinary subjects such as physics, chemistry and mathematics etc. Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevance in the day-to-day life.

PSO2. Effective Communication- Development of various communication skills such as reading, listening, speaking, etc., which we will help in expressing ideas and views clearly and effectively.

PSO3. Social Interaction- Development of scientific outlook not only with respect to science subjects but also in all aspects related to life.

PSO4. Effective Citizenship- Imbibe moral and social values in personal and social life leading to highly cultured and civilized personality.

PSO5. *Ethics-* Follow the ethical principles and responsibilities to serve the society.

PSO6. Environment and Sustainability- Understand the issues of environmental contexts and sustainable development.

PSO7. Self-directed and Lifelong learning- Students will be capable of self- paced and selfdirected learning aimed at personal development and for improving knowledge/skill development.

Anekant Education Society's Tuljaram Chaturchand College, Baramati (Autonomous)

Board of Studies (BOS) in Environmental Science

Sr.No.	Name	Designation
1.	Ms. Surashri S. Sonawane	Chairman
2.	Dr. Ajit Telave	Member
3.	Dr. Vitthal Nale	Member
4.	Dr. Yogesh Indulkar	Member
5.	Dr. Arun Magar	Member
6.	Dr. Neeta Dhane	Member
7.	Mr. Abhijit More	Member
8.	Ms. Neeta Sarode	Member
9.	Dr. Rachana Ingavale	Expert from other University
10.	Dr. Asawari Jadhav	Expert from other University
11.	Dr. Ganesh Kadam	Industry Expert
12.	Ms.Sakshi Upadhyay	Student Represent
13.	Mr.Pradip Shikare	Student Representative

From 2022-23 to 2024-25

Department of Environmental Science F.Y.B.Sc.

Course and Credit Distribution Structure for B.Sc. (Environmental Science)-2024-2025

Credit Distribution Structure for Three/Four Year Honours/Honours with Research Degree Programme With Multiple Entry and Exit options as per National Education Policy (2024 Pattern as per NEP-2020)

Level/ Difficult y	Sem	Subject DSC-1				Subject DSC-2	Subject DSC-3	GE/OE	SEC	IKS	AEC	VEC	сс	Total
4.5/100	Ι	2(T)+2(P)			2(T)+2(P)	2(T)+ 2(P)	2(T)	2 (T/P)	2(T) (Generic)	2(T)	2(T)		22	
	II	2(T)+2(P)				2(T)+2(P)	2(T)+2(P)	2(P)	2 (T/P)		2(T)	2(T)	2(T	22
Exit opti	on: Awa	ard of UG Cer	tificate in Major	with 44	credits and a	an additional	4 credits co	ore NSQF cou	rse/Inter	nship OR (Continue	with N	Aajor a	nd Minor
Continue	option.	Student will s	Credits Rel		Major	1, subject 2	and subject	<i>s)</i> as major a	nu ouiei	as minor a		subject	will be	aroppea.
Level/			Major		lajoi									
Difficult v	Sem	Major Core	Electiv	VSC	FP/OJT/C EP/RP	Minor		GE/OE	SEC	IKS	AEC	VEC	СС	Total
			e							2(T)				
5 0/200	III	4(T)+2(P)		2 (T/P)	2(FP)	2(T)+2(P)		2(T)			2(T)		2(T)	22
5.0/200	IV	4(T)+2(P)		2 (T/P)	2(CEP)	2(T)+2(P)		2(P)	2 (T/P)		2(T)		2(T)	22
Exit opt	Exit option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4credits core NSQF course/Internship OR Continue with Major and Minor													
	v	8(T)+4(P)	2(T)+2(P)	2 (T/P)	2(FP/CEP)	2(T)								22
5.5/300	VI	8(T)+4(P)	2(T)+2(P)	2 (T/P)	4 (OJT)									22
Total .	3Years	44	8	8	10	18	8	8	6	4	8	4	6	132
	Exit option: Award of UG Degree in Major with 132 credits OR Continue with													
		(T) (T)			1(DD)	Major and	Minor							22
6 0/400	VII	6(1)+4(P)	2(1)+2 (1/P)		4(RP)	4(RM)(1)								22
0.0/400	VIII	6(T)+4(P)	2(T)+2 (T/P)		6(RP)									22
Total 4	4Years	64	16	8	22	22	8	8	6	4	8	4	6	176
			Four Year U	G Honor	urs with Re	search Degi	ee in Major	and Minor w	ith 176 c	redits				
	VII	10(T)+4(P)	2(T)+2 (T/P)			4(RM) (T)								22
6.0/400	VIII	10(T)+4(P)	2(T)+2 (T/P)		4 (OJT)									22
Total 4	4Years	72	16	8	14	22	8	8	6	4	8	4	6	176
			Four	Year U	G Honours	Degree in M	lajor and Mi	nor with 176	credits			1		
T = Theo	rv P =	Practical	$\mathbf{DSC} = \mathbf{Disc}$	ipline S	pecific Co	urse	OE = Ope	n Elective		SEC = Sk	ill Enh	ancem	ent Co	urse
	- , - –	- rueueu		_ AL:1:4	r Enhance	mont Com		$C = V_{clue}$	Educati			CC -	Co	mioulon
$\mu \mathbf{KS} = \ln \theta$	uan Kn	iowiedge Sy	stein AEC	= A0111	y Ennance	ment Cour	se VE	$\mathbf{C} = \mathbf{v}$ and \mathbf{c}		on Course	;	UU =	Co-cu	mcular
Course														
VSC = Vc	ocationa	al Skill Cour	se OJT =	On Job	Training	CEP= C	ommunity	Engagemen	t Projec	t FP:	= Field	Projec	t F	RP=
Research	Research Project													

F.Y.B.A. Environmental Science

NEP-2.0

Course Structure for F.Y.B.Sc. Environmental Science (2024 Pattern)

Sem	Course Type Course Code		Course Title	Theory /	Credits	
				Practical		
	DSC-I (General)	-101-GEN		Theory	04	
	DSC-II (General)	-101-GEN		Theory	04	
	DSC III(Conoral)	ENV-101-GEN		Basics of Environmental Science	Theory	02
		ENV-102-GEN	Environment Science Practical-I	Practical	02	
	Open Elective (OE)	ENV-103-OE	Disasters and their Management	Theory	02	
Ι	Skill Enhancement Course (SEC)	ENV-104-SEC	Introduction to lab instruments	Practical	02	
	Ability Enhancement Course (AEC)	ENG-104-AEC		Theory	02	
	Value Education Course (VEC)	ENV-105-VEC	Environmental Education	Theory	02	
	Generic Indian Knowledge System (GIKS)	GEN-106-IKS		Theory	02	
			7	Fotal Credits	22	
	DSC-I (General)	-151-GEN		Theory	04	
	DSC-II (General)	-151-GEN		Theory	04	
	DSC-III (General)	ENV-151-GEN	Fundamentals of Environmental Biology	Theory	02	
		ENV-152-GEN	Environment Science Practical-II	Practical	02	
	Open Elective (OE)	ENV-153-OE	Environmental Management and Safety	Practical	02	
II	Skill Enhancement Course (SEC)	ENV-154-SEC	Sustainable Agricultural Practices	Practical	02	
	Ability Enhancement Course (AEC)	ENG-154-AEC		Theory	02	
	Value Education Course (VEC)	COS-155-VEC	Digital and technological solutions	Theory	02	
	СС	YOG/PES/CUL/N	To be selected from the CC Basket	Theory	02	
		55/INCC-150-CC		Fotal Credits	22	
			Grand Total Se	m I + Sem II	44	

CBCS Syllabus as per NEP 2020 for F.Y.B.Sc. Environmental Science (2024 Pattern)

Name of the Programme	: B.Sc. Environmental Science
Programme Code	: USENV
Class	: F.Y.B.Sc.
Semester	:I
Course Type	: DSC-I (General) (Theory)
Course Code	: ENV-101-GEN
Course Title	: Basics of Environmental Science
No. of Credits	:02
No. of Teaching Hours	: 30

Course Objectives:

1. To learn basic characteristics of environment.

2. To make the students aware about the environment and its significance.

3. To learn about interrelationship and discipline in environment science.

4. To improve management of environment and provide satisfactory solutions to environmental issues.

5. Imparting basic knowledge about the environment and its allied problems.

6. Motivating public to participate in environment protection and environment improvement.

7. Recognize, describe, and quantitatively describe Earth systems, including the land, water, sea, and atmosphere, and how these function collectively to support life on Earth.

Course Outcomes:

By the end of the course, students will be able to:

CO1. Students would understand the knowledge about components of environment.

CO2. Students will understand the knowledge about Environmental problems and their solutions.

CO3. Discover knowledge in ecological perspective and value of environment.

CO4. Demonstrate a comprehensive understanding of the world's biodiversity and the importance of its conservation.

CO5. Understand the significance of various natural resources and its management.

CO6. Students develop critical-thinking skills, analyze real-world problems, and understand the power of narrative to create sustainable solutions for local and global communities.

CO7. To explore environmental issues, engage in problem solving, and take action to improve the environment.

Topics and Learning Points

Teaching Hours 10

10

10

UNIT 1: Introduction and components of Environment

- 1.1 Definition, principles and scope of Environmental Science
- 1.2 Multidisciplinary and dynamic nature of environmental science
- 1.3 Components of Environment: Lithosphere
- 1.4 Hydrosphere
- 1.5 Atmosphere

UNIT 2: Man & Biosphere

- 2.1 Definition and Components of Biosphere
- 2.2 Concept of Holocene, Holocene Climate Optimum
- 2.3 Characteristics and causes of the Anthropocene
- 2.4 Human influence on environment
- 2.5 Current Environmental issues

UNIT 3: Introduction to GIS and Remote Sensing

- 3.1 Introduction to GIS and Remote sensing
- 3.2 Components and Types of GIS Data, Digital image processing and ground truthing.
- 3.3 Application of remote sensing and GIS in land cover/land use planning and

management (urban sprawling, vegetation study, forestry, natural resource).

References:

- 1. Fundamentals of Ecology: Eugene P. Odum, (Natraj Publishers, Dehradun.)
- 2. Climatology: D.S.Lal (Sharda Pustak Bhawan, Allahabad)
- 3. Environmental Geography : Savindra Singh (Pravalika Publications, Prayagraj)
- 4. Physical Geography: Savindra Singh (Pravalika Publications, Prayagraj)
- 5. Disaster Management: Savindra Singh (Pravalika Publications, Prayagraj)
- 6. Principles of Ecology: P. S. Verma, V. K. Agarwal (S. Chand and Co. New Delhi)
- 7. Environmental Biology: P. D. sharma (Rastogi Publications, Meerut)
- 8. Ecology and Environment: P. D. sharma (Rastogi Publications, Meerut)
- 9. Principles of Environmental Biology: P. K. G. Nair (Himalaya Publishing House, New Delhi)

10. Environmental Biology: M. P. Arora (Himalaya Publishing House, New Delhi)

- 11. Environmental Science: Enger Smith, Smith, W. M. C. Brown (Company Publishing)
- 12. Principles of Soil Science: Watt K. E. F. (1973), (McGraw Hill Book Company, New Delhi)
- 13. Introduction to Environmental Studies: Turk & Turk
- 14. Ecology and Field Biology: Robert Leo Smith (Harper Collins college publication)
- 15. General Ecology: H. D. Kumar (Vikas Publishing house, New Delhi)
- 16. Elements of Ecology: Brijgopal, N. Bharadwaj (Vikas Publishing house, New Delhi)

17. Fundamentals of Environmental Science :G. S. Dahliwal, G. S. Sangha, P. K. ralhan(Kalyani Publishers, New Delhi)

18. Environmental Ecology: Bill Freedman (Academic Press, New York)

- 19. Concepts of Ecology: N. Arumugam (Saras Publication, Kottar, Dist. Kanyakumari)
- 20. Plant Ecology: P. L. Kochhar

21. Environmental Science and Engineering: Dr.N.Arumugam,Prof.V.Kumaresan (Saras Publication, Kottar, Dist. Kanyakumari)

22. Perspectives in Environmental Studies: Anubha Kaushik, C.P.Kaushik (New Age International (P) Limited, Publishers)

	Programme Outcomes (POs)								
Course	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
Outcomes									
CO 1	3	2							2
CO 2	3	2							
CO 3	3			2					
CO 4	3			2					
CO 5								3	
CO 6		2	3		2	2			
CO 7			3				3	3	

Mapping of Program Outcomes with Course Outcomes

Justification for the mapping

PO1: Disciplinary Knowledge

CO1: Attain a profound comprehension of the fundamental components that constitute the environment.CO2: Acquire in-depth knowledge concerning environmental issues and devise effective solutions to address them.

CO3: Explore and assimilate knowledge through an ecological lens, recognizing the intrinsic value of theenvironment.

CO4: Demonstrate a holistic understanding of global biodiversity and recognize the paramountimportance of conserving it.

PO2: Critical Thinking and Problem Solving

CO1: Apply critical thinking to comprehend the intricate components of the environment.CO2: Utilize critical thinking to identify and address environmental problems effectively.

CO6: Develop critical-thinking skills to analyze environmental issues and devise sustainable solutions.

PO3: Social competence:

CO6: Demonstrate personal and professional competence in addressing environmental challenges. CO7: Engage in social competence by actively participating in environmental problem-solving and improvement initiatives.

PO4: Research-related skills and Scientific temper:

CO3: Conduct research within an ecological perspective, emphasizing the value of the environment.CO4: Demonstrate a scientific temper in understanding global biodiversity and its conservation.

PO5: Trans-disciplinary Knowledge

CO6: Apply trans-disciplinary knowledge to analyze and solve environmental problems.

PO6: Personal and Professional Competence

CO6: Demonstrate personal and professional competence by applying critical-thinking skills to addressenvironmental challenges.

PO7: Effective Citizenship and Ethics:

CO7: Act as an effective citizen by engaging in problem-solving activities to enhance the environment.

PO8: Environment and Sustainability:

CO5: Understand the significance of various natural resources and contribute to their sustainablemanagement.

CO7: Take action to improve the environment, emphasizing sustainability.

PO9: Self-directed and Life-long Learning

CO1: Foster self-directed and life-long learning by acquiring comprehensive knowledge of environmental components.

CBCS Syllabus as per NEP 2020 for F.Y.B.Sc. Environmental Science (2024 Pattern)

Name of the Programme	: B.Sc. Environmental Science
Programme Code	: USENV
Class	: F.Y.B.Sc.
Semester	:I
Course Type	: DSC-I (General) (Practical)
Course Code	: ENV-102-GEN
Course Title	: Environmental Science Practical-I
No. of Credits	:02
No. of Teaching Hours	: 60

Course Objectives:

- 1. To learn that adaptation allows organisms to survive and reproduce in their natural environment.
- 2. Understand the importance of environment by accessing its impacts on the human world.
- 3. To understand basic nature of soil.
- 4. To understand the environmental significance of water quality.
- 5. To understand the different types of ecosystems.
- 6. Develop an ability to handle the apparatus carefully and the resources wisely.
- 7. Develop scientific understanding of physical world.

Course Outcomes:

By the end of the course, students will be able to:

- **CO1.** Demonstrate a compressive understanding of the world biodiversity and the importance of its conservation.
- CO2. Understand the significance of various natural resources and its management.
- CO3. Evaluate hazards and risks in order to carry out a risk assessment.
- **CO4.** Students will use a verity of laboratory techniques to safely conduct chemical experiments and procedures.
- **CO5.** To understand verity of ecosystem of their own locality.
- **CO6.** Describe the ecological value and consumptive use of ecosystem.

CO7. Students will have opportunity to work in research lab, bio fertilizer industry and canalso be bio-entrepreneurs.

Topics and Learning Points

- 1. To study the lab safety rules.
- 2. To study the basics of chemical preparation.
- 3. To study of Soil Profile & Soil Texture.
- 4. Determination of Soil and water pH and Electric Conductivity.
- 5. Determination of water holding capacity of a given soil sample.
- 6. Estimation of acidity of given water sample.
- 7. Estimation of alkalinity of given water sample.
- 8. To determine the hardness of given water sample.
- 9. Estimation of dissolved oxygen from water by Winkler's method.
- 10. Study of land use planning and management.
- 11. Draw the Climograph from given data and interpret it.
- 12. Draw the simple windrose diagram and interpret it.
- 13. To Study the basics of Geographical Information System
- 14. Measurement of Atmospheric Humidity by Hair-Hygrometer and light by Lux Meter.
- 15. Visit of any ecosystem and submission of Excursion report is compulsory at the time of practical examination.

*Any other relevant practical related to syllabus

References:

1. Environmental Science: A Practical Manual Book by G Lakshmi Swarajya and P Prabhu Prasadini (2018)

2. Environmental Chemical Analysis Laboratory Manual, Prepared by Dr. Erik Krogh, Dr.

ChrisGill, Shelley Gellein, and Peter Diamente Department of Chemistry, 2018

- 3. Environmental Chemistry: S. e. Manahan
- 4. The Chemistry of Our Environment: R. A. Hom

	Programme Outcomes								
Course	(POS) Course PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9								
Outcomes	101	102	105	104	105	100	107	100	10)
CO1	3						3		
CO2					2			3	
CO3		2							
CO4		2							
CO5			3					3	
CO6				2					
CO7						2			2

Mapping of Program Outcomes with Course Outcomes

Justification for the mapping

PO1: Disciplinary Knowledge:

CO1: Demonstrate a comprehensive understanding of the world's biodiversity and emphasize the importance of its conservation within the realm of disciplinary knowledge.

PO2: Critical Thinking and Problem solving:

CO3: Evaluate hazards and risks, showcasing critical thinking skills essential for conducting a risk assessment.

CO4: Utilize a variety of laboratory techniques to safely conduct chemical experiments and procedures, demonstrating critical thinking and problem-solving abilities.

PO3: Social competence:

CO5: Understand the variety of ecosystems in their own locality, contributing to social competence inenvironmental awareness.

PO4: Research-related skills and Scientific temper:

CO6: Describe the ecological value and consumptive use of ecosystems, showcasing research-relatedskills and a scientific temper.

PO5: Trans-disciplinary knowledge

CO2: Understand the significance of various natural resources and their management from a trans-disciplinary perspective.

PO6: Personal and professional competence

CO7: Provide students with opportunities to work in research labs, bio-fertilizer industries, and encouragethem to explore bio-entrepreneurship, enhancing personal and professional competence.

PO7: Effective Citizenship and Ethics:

CO1: Demonstrate a comprehensive understanding of the world's biodiversity, emphasizing its conservation and contributing to effective citizenship and ethical considerations.

PO8: Environment and Sustainability:

CO2: Understand the significance of various natural resources and their management, emphasizing environmental sustainability.

CO5: To understand a variety of ecosystems in their own locality, promoting environmental awarenessand sustainability.

PO9: Self-directed and Life-long learning:

CO7: Provide students with opportunities to work in research labs, bio-fertilizer industries, and engage inbio-entrepreneurship, fostering self-directed and life-long learning.

CBCS Syllabus as per NEP 2020 for F.Y.B.A Geography (2024 Pattern)

Name of the Programme	: B.Sc. Environmental Science
Programme Code	: USENV
Class	: F.Y.B.Sc.
Semester	:I
Course Type	: Open Elective (Theory)
Course Code	: ENV-103-OE
Course Title	: Disasters and their Management
No. of Credits	:02
No. of Teaching Hours	: 30

Course Objectives:

- 1. To provide basic conceptual understanding of disasters and its relationship with development.
- 2. To gain understand approaches of disaster risk reduction and the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- 3. To reduce the harmful effects of all hazards, including disasters.
- 4. To understand medical and psycho-social response to disasters.
- 5. To prevent and control public health consequences of disasters.
- 6. To enhance awareness of disaster risk management institutional processes in India.
- 7. To build skills to respond to disasters.

Course Outcomes:

By the end of the course, students will be able to:

- **CO1.** Warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle.
- **CO**2. Plans that either modify the causes of disasters or mitigate their effects on people, property, and infrastructure.
- CO3. Application of disasters concepts to management.
- **CO4.** Analyze relationship between development and disasters.
- CO5. Preparedness plans for disasters response.
- CO6. Monitoring and evaluation plan for disaster response.
- CO7. Emerging first aid at disaster site.

Topics and Learning Points

UNIT 1: Introduction

- 1.1 Disasters: Definition, History of disasters; Components of disasters.
- 1.2 Types of disasters
- 1.3 Weather parameters: Concept, Role of meteorological parameters in disasters prediction.
- 1.4 Mitigation and Management techniques of Disaster
- 1.5 Disaster Management Authority and Planning disaster management at National,State and District levels

UNIT 2: Natural Disasters and Management

- 2.1 Introduction to natural disaster-Earthquake, Flood, Tsunami
- 2.2 Causative agent
- 2.3 Environmental effects and recovery
- 2.4 Management
- 2.5 Case study on natural disaster

UNIT 3: Man-made disasters and Management

- 3.1 Introduction to man-made disaster Oil Spill, Forest Fire, Toxic waste
- 3.2 Causative agents
- 3.3 Impacts of anthropogenic activities
- 3.4 Management of manmade disasters
- 3.5 Case study on man-made disaster

References:

- 1. Bhattacharya, T. (2012). Disaster Science and Management. Tata McGraw-Hill Education.
- 2. Collins, L. R. (2000). Disaster management and preparedness. CRC Press.
- 3. Kapur, A. (2010). Vulnerable India: a geographical study of disasters. SAGE Publications India.
- 4. Murthy, D. B. N. (2007). Disaster Management: Text and case studies. Deep and DeepPublications.
- 5. Rajendra Kumar Pandey. (2020). Disaster Management in India. SAGE Publications, Incorporated.
- 6. Roy, T. (2012). Natural Disasters and Indian History: Oxford India Short Introductions.OUP Catalogue.

Teaching Hours 10

10

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- 7. Sahni, P., Dhameja, A., and Medury, U. (2001). Disaster mitigation: experiences and reflections. PHI Learning Pvt. Ltd..
- 8. Sharma, S. C. 2008. Disaster Management. Khanna Publishing House. Shrivastava, A. K.(2015). Text book of Disaster Management. Scientific Publishers.
- 9. Sulphey, M. M. (2016). Disaster management. PHI Learning Pvt. Ltd.

Programme Outcomes (POs)									
Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
Outcome									
S									
CO1		2					3		
CO2		3						3	
CO3	3								3
CO4				2					
CO5					3				
CO6						2			
CO7			3						

Mapping of Program Outcomes with Course Outcomes

Justification for the mapping

PO1: Disciplinary Knowledge:

CO3: Apply concepts related to disasters to enhance disciplinary knowledge in disaster management.

PO2: Critical Thinking and Problem solving:

CO1: Develop warnings, reduce vulnerability, and prevent disasters in the next iteration of the cycle, showcasing critical thinking and problem-solving skills.

CO2: Devise plans to modify the causes of disasters or mitigate their effects on people, property, and infrastructure, demonstrating critical thinking and problem-solving abilities.

PO3: Social competence:

CO7: Provide emerging first aid at disaster sites, contributing to social competence in disaster response.

PO4: Research-related skills and Scientific temper:

CO4: Analyze the relationship between development and disasters, showcasing research-related skills and a scientific temper.

PO5: Trans-disciplinary knowledge

CO5: Develop preparedness plans for disaster response from a trans-disciplinary perspective.

PO6: Personal and professional competence

CO6: Develop a monitoring and evaluation plan for disaster response, enhancing personal and professional competence in disaster management.

PO7: Effective Citizenship and Ethics:

CO1: Develop warnings, reduce vulnerability, and prevent disasters, contributing to effective citizenshipand ethical considerations in disaster management.

PO8: Environment and Sustainability:

CO2: Devise plans to modify the causes of disasters or mitigate their effects, emphasizing environmental sustainability in disaster response.

PO9: Self-directed and Life-long learning:

CO3: Apply disaster concepts to management, fostering self-directed and life-long learning in disasterpreparedness and response.

CBCS Syllabus as per NEP 2020 for F.Y.B.Sc. Environmental Science (2024 Pattern)

Name of the Programme	: B.Sc. Environmental Science
Programme Code	: USENV
Class	: F.Y.B.Sc
Semester	: I
Course Type	: Skill Enhancement Course (SEC) (Practical)
Course Code	: ENV-104-SEC
Course Title	: Introduction to lab Instruments
No. of Credits	:02
No. of Teaching Hours	: 60

Course Objectives:

- 1) Understand how to carry out a basic experiment utilizing common laboratory equipment.
- 2) To minimize the risk of injury or illness to laboratory workers by ensuring that they have the training, information and support needed to work safely in the laboratory.
- 3) Develop the understanding of procedural knowledge.
- 4) Develop interest and motivation through laboratory which will lead to development of positive attitude.
- 5) Develop an ability to express them coherently and logically.
- 6) An appreciation for the products and influences of science and technology.
- 7) Develop scientific understanding of the physical world.

Course Outcomes:

By the end of the course, students will be able to:

CO1. Developing understanding in designing experiments

- CO2. Development of skills to avoid hazards.
- **CO3.** Make able to write reports of laboratory work.
- CO4. Lab work develops confidence among the students.
- **CO5.** Develop ability to verify theoretical knowledge.
- CO6. Developing understanding regarding handling of data.
- CO7. Develop understanding about inferring and predicting.

Topics and Learning Points

- 1. Study the lab safety symbols.
- 2. Introduction to laboratory apparatus.
- 3. Study the procedure for handling the lab equipment/instrument.
- 4. Study principle and working of thermometer.
- 5. To understand calibration of weighing machine.
- 6. Study principles and working of magnetic stirrer.
- 7. Understand the principles and working of hot air oven.
- 8. Study principles and working of centrifuge.
- 9. Introduction to principles and working of Autoclave.
- 10. Demonstration of pH meter calibration.
- 11. To understand calibration of turbidity meter.
- 12. Study principles and working water bath.
- 13. Demonstration of EC meter calibration.
- 14. To study and Demonstration of spectrophotometer.
- 15. To study principle and working of flame photometer.

References:

1. Environmental Chemical Analysis Laboratory Manual, Prepared by Dr. Erik Krogh,

- Dr. ChrisGill, Shelley Gellein, and Peter Diamente Department of Chemistry, 2018
- 2. The Laboratory Companion: A Practical Guide to Materials, Equipment, and Technique, Gary
- S. Coyne, Wiley, 2006
- 3. Environmental Chemistry: S. e. Manahan
- 4. The Chemistry of Our Environment: R. A. Hom

Mapping of Program Outcomes with Course Outcomes

Programme Outcomes (POs)									
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1		3							2
CO2		3						3	
CO3			3				3		
CO4						3			
CO5	3								3
CO6				2					
CO7					2				

Justification for the mapping

PO1: Disciplinary Knowledge:

CO5: Develop the ability to verify theoretical knowledge as part of disciplinary knowledge.

PO2: Critical Thinking and Problem solving:

CO1: Develop an understanding of designing experiments, fostering critical thinking and problemsolvingskills.

CO2: Develop skills to avoid hazards, promoting critical thinking in the context of safety.

PO3: Social competence:

CO3: Develop the capability to write reports on laboratory work, contributing to social competence in effective communication.

PO4: Research-related skills and Scientific temper:

CO6: Develop an understanding of handling data, enhancing research-related skills and fostering ascientific temper.

PO5: Trans-disciplinary knowledge

CO7: Develop an understanding of inferring and predicting, contributing to trans-disciplinary knowledge.

PO6: Personal and professional competence

CO4: Lab work develops confidence among students, promoting personal and professional competence.

PO7: Effective Citizenship and Ethics:

CO3: Develop the capability to write reports on laboratory work, emphasizing effective citizenship andethical communication.

PO8: Environment and Sustainability:

CO2: Development of skills to avoid hazards, emphasizing environmental sustainability and safety.

PO9: Self-directed and Life-long learning:

CO1: Develop an understanding of designing experiments, fostering self-directed and life-long learningskills.

CO5: Develop the ability to verify theoretical knowledge, contributing to ongoing self-directed learning.

CBCS Syllabus as per NEP 2020 for F.Y.B.A Geography (2024 Pattern)

Name of the Programme	: B.Sc. Environmental Science
Programme Code	: USENV
Class	: F.Y.B.Sc.
Semester	: I
Course Type	: Value Education Course (VEC) (Theory)
Course Code	: ENV-105-VEC
Course Title	: Environmental Education
No. of Credits	:02
No. of Teaching Hours	: 30

Course Objectives:

- 1. To learn how the natural world works, to understand how humans interact with the environment, and to find ways to deal with environmental problems and live more sustainably.
- 2. Analyze the interrelationship between living organism and environment.
- 3. Awareness and sensitivity to the environment and environmental challenges.
- 4. To prevent pollution, meet compliance obligations and enhance conditions of the environment.
- 5. Students understand biodiversity in the context of ecosystem dynamics, ecosystem functioning and provision of ecosystem services.
- 6. To maintain life-supporting systems and essential ecological processes.
- 7. To provide protection to the ecosystem from degradation and therefore the consumption of resources must be reduced.

Course Outcomes:

By the end of the course, students will be able to:

- **CO1.** Students will realize that people are dependent on intact habitats that sustain the variousorganisms we need to produce food, medicines, clothing, and other materials.
- **CO2.** Demonstrate a comprehensive understanding of the world's biodiversity and the importance of its conservation.
- CO3. Discover knowledge in ecological perspective and value of environment.

- **CO4.** To develop the attitude to take steps for environmental protection. There should be asense of responsibility among the population to protect the environment.
- **CO5.** Environmental Science student are able to acquire knowledge, competent professionals with a strong foundation of Environmental Science and application to be suitable for vital positions in the academia, industry and government and non-government institutions asskilled manpower.
- **CO6.** Develop critical-thinking skills, analyze real-world problems, and understand the powerof narrative to create sustainable solutions for local and global communities.
- **CO7.** Demonstrate an integrative approach to environmental issues with a focus on sustainability.

	Teaching Hours
UNIT 1: Introduction to environmental studies	10
 1.1 Multidisciplinary nature of environmental studies 1.2 Scope and importance 1.3 Concept of sustainability and sustainable development 1.4 Interrelationship of ecology with other disciplines 1.5 Ecology and its types 	
UNIT 2: Ecosystems and Biodiversity Conservation	10
2.1 Definition, Types, Structure and function of ecosystem2.2 Energy flow in an ecosystem: food chains, food webs and ecologica2.3 Biogeographic zones of India; biodiversity hot spots2.4 Endangered and endemic species of India2.5 Threats to biodiversity	al succession.
UNIT 3: Environmental pollution	10
 3.1 Environmental pollution- types, causes, effects and controls; Air, V andNoise pollution 3.2 Nuclear hazards and human health risks 3.3 Solid Waste management- control measures of urban and industria 3.4 Pollution case studies 	Water, Soil 1 waste

References:

- 1. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12th Edition, 2015.
- 2. Erach Bharucha, "Textbook of Environmental Studies for Under Graduate Courses", OrientBlack Swan, 2nd Edition, 2013.
- 3. Benny Joseph, "Environmental Studies", Tata Mc Graw Hill Publishing Co. Ltd, New Delhi, 1 st Edition, 2006.
- 4. Environmental Biology : P. D. sharma (Rastogi Publications, Meerut)
- 5. Principles of Ecology: P. S. Verma, V. K. Agarwal (S. Chand and Co. New Delhi)
- 1. Principles of Environmental Biology : P. K. G. Nair (Himalaya Publishing House, NewDelhi)
- 2. Environmental Biology : M. P. Arora (Himalaya Publishing House, New Delhi)
- 3. Environmental Science : Enger Smith, Smith, W. M. C. Brown (Company Publishing)
- 4. General Ecology : H. D. Kumar (Vikas Publishing house, New Delhi)
- 5. Elements of Ecology :Brijgopal, N. Bharadwaj (Vikas Publishing house, New Delhi)
- 6. Fundamentals of Environmental Science : G. S. Dahliwal, G. S. Sangha, P. K. ralhan
- 7. (Kalyani Publishers, New Delhi)
- 8. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of ConservationBiology. Sunderland: Sinauer Associates, 2006.
- 9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia:Saunders.
- 10. Raven, P.H., Hassenzahl, D.M. & Berg, L. R. 2012. Environment. 8th edition. John Wiley &Sons.
- 11. Sengupta, R. 2003. Ecology and economics : An approach to sustainable development. OUP.
- 12. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
- 13. World Commission on Environment and Development. 1987. Our Common Future. OxfordUniversity Press.

Mapping of Progran	n Outcomes with	1 Course (Outcomes
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Programme Outcomes (POs)										
Course Outcome s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	
CO1	3							3		
CO2		2							2	
CO3			3							
CO4				3			2			
CO5				2		3				
CO6		3								
CO7					2			3		

AES's T. C. College (Autonomous), Baramati. NEP-2.0 CBCS Syllabus 2024 Pattern as per NEP 2020

Justification for the mapping

PO1: Disciplinary Knowledge:

CO1: Realize the dependence of people on intact habitats, understanding their role in sustaining organisms essential for producing food, medicines, clothing, and other materials.

PO2: Critical Thinking and Problem solving:

CO2: Demonstrate a comprehensive understanding of the world's biodiversity and emphasize theimportance of its conservation.

CO6: Develop critical-thinking skills to analyze real-world problems and recognize the power of narrative in creating sustainable solutions for local and global communities.

PO3: Social competence:

CO3: Discover knowledge in an ecological perspective and recognize the value of the environment, enhancing social competence in environmental awareness.

PO4: Research-related skills and Scientific temper:

CO4: Develop an attitude to take steps for environmental protection, fostering a sense of responsibilityamong the population.

CO5: Acquire knowledge and become competent professionals with a strong foundation in EnvironmentalScience, suitable for vital positions in academia, industry, and government and non-government institutions as skilled manpower.

PO5: Trans-disciplinary knowledge

CO7: Demonstrate an integrative approach to environmental issues with a focus on sustainability, reflecting trans-disciplinary knowledge.

PO6: Personal and professional competence

CO5: Acquire knowledge and become competent professionals with a strong foundation in EnvironmentalScience, contributing to personal and professional competence.

PO7: Effective Citizenship and Ethics:

CO4: Develop an attitude to take steps for environmental protection, emphasizing effective citizenshipand ethical considerations.

PO8: Environment and Sustainability:

CO1: Realize the dependence of people on intact habitats and understand their role in sustaining organisms, contributing to environmental sustainability.

CO7: Demonstrate an integrative approach to environmental issues with a focus on sustainability.

PO9: Self-directed and Life-long learning:

CO2: Demonstrate a comprehensive understanding of the world's biodiversity and emphasize the importance of its conservation, fostering self-directed and life-long learning.

CBCS Syllabus as per NEP 2020 for F.Y.B.Sc. Environmental Science (2024 Pattern)

Name of the Programme	: B.Sc. Environmental Science
Programme Code	: USENV
Class	: F.Y.B.Sc.
Semester	: 11
Course Type	: DSC-I (General) (Theory)
Course Code	: ENV-151-GEN
Course Title	: Fundamentals of Environmental Biology
No. of Credits	:02
No. of Teaching Hours	: 30

Course Objectives:

- 1. Understanding evolution helps us solve biological problems that impact our lives.
- 2. To understand the distribution of biotic and abiotic factors of living things in the environment.
- 3. Gain an understanding of how various nutrients are cycled through ecosystems.
- 4. Explain core concepts in ecology and summarize our ecological understanding of environmental problems
- 5. Summarize changes in economics, policy, and education that promote sustainability
- 6. Relate the features of human populations to different types of environmental degradation
- 7. To provide a course of basic comparative physiology, introducing students to the principles of normal biological function in a wide range of organisms.

Course Outcomes:

- CO1. Students will acquire knowledge about bioresources.
- CO2. Study of biodiversity and apply that knowledge in day to day life.
- CO3. Imparts conceptual knowledge of environment, their adaptations and interrelationship.
- **CO4.** Use interdisciplinary approaches such as ecology, economics, ethics and policy to devisesolutions to environmental problems.
- **CO5.** Be proficient in ecological field methods such as wildlife survey, biodiversity assessment,mathematical modeling and monitoring of ecological systems.

- **CO6.** Apply the scientific method and quantitative techniques to describe, monitor and understand environmental systems.
- **CO7.** Evaluate current environmental issues and problems including the solutions and management practices that have been used or offered to address these issues and problems.

Topics and Learning Points

Teaching Hours

10

10

10

UNIT 1: Origin of Life and evolution

1.1 Introduction to Biology, branches, scope and importance

1.2 The origin of Life

1.3 Evolution of Life through the geological time i.e. – Eras, Periods, Epochs; Chemical evolution

1.4 Events of 'Explosions' and 'Mass Extinctions'& Paleontological Evidences for these Geological time scale

UNIT 2: Ecology & Ecosystem:

- 2.1 Ecology and its types
- 2.2 Structure & function of ecosystem, Ecological pyramids Food chain.
- 2.3 Food web Basis of Ecosystem classification.
- 2.4 Types of Ecosystem: Terrestrial e.g. Desert (hot and cold), forest, rangeland,
- 2.5 Aquatic e.g. wetlands, lotic, lentic, estuarine (mangrove), Oceanic ecosystems.

UNIT 3: Ecology, Ecological adaptation and Bioresources

3.1 Introduction, Ecological Adaptations under various environmental conditions –in plants and in animals

- 3.2 Types and interaction predation, herbivory, parasitism and allelopathy.
- 3.3 Concept of 'r' and 'k' species, Keystone species.
- 3.4 Biological invasions, Succession.
- 3.5 Bioresources-Definition, Bioindicators, Biopesticides, Biofertilizers, Biofuels, Biosensors

References:

- 1. Ambashta R.S. & Ambashta N.K (1999) 'A Textbook of Plant Ecology' CBS Publ. & Distributers, New Delhi
- 2. Chapman J.L. & Reiss M.J. (1995) 'Ecology: Principles and Applications' CambridgeUniversity Press
- Cunningham W.P. & Saigo S.W. (1997) 'Environmental Science: A Global Concern' WCB, McGraw Hill
- 4. Sharma P.D. 'Elements of Ecology'
- 5. Tyler M.G. Jr. (1997) 'Environmental Science' Wadsworth Publ. Co
- 6. Vashista P.C. 'Textbook of Plant Ecology'
- 7. Smith R.L. 'Ecology and Field Biology'
- 8. Benny Joseph (2005) 'Environmental Studies' Tata McGraw Hill Publ. Co. Ltd.
- 9. Patterns in the Living World' Biology-an Environmental approach, John Murray,London
- 10. 'Diversity Among Living Things' Biology-an Environmental approach, John Murray, London
- 11. Bell P.R. & Woodcock Christopher (1973) 'The Diversity of Green Plants' Edward Arnold Ltd.
- 12. Wilson N. Stewart (1983) 'Paleobotany and the Evolution of Plants' CambridgeUniversity Press
- 13. Perspectives in Environmental Studies: Anubha Kaushik, C.P.Kaushik (New Age International(P) Limited, Publishers)
- 14. Environmental Science and Engineering: Dr.N.Arumugam,Prof.V.Kumaresan(Saras Publication, Kottar, Dist. Kanyakumari)
- 15. Environmental Biology: P. D. sharma (Rastogi Publications, Meerut)
- 16. Ecology and Environment: P. D. sharma (Rastogi Publications, Meerut)

Programme Outcomes (POs)									
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3							3	2
CO2		2	3						
CO3				2				3	
CO4		2			3				
CO5				2				3	
CO6						2			
CO7							2		

Mapping of Program Outcomes with Course Outcomes

Justification for the mapping

PO1: Disciplinary Knowledge:

CO1: Acquire comprehensive knowledge about bioresources to strengthen disciplinary knowledge.

PO2: Critical Thinking and Problem solving:

CO2: Apply the study of biodiversity in day-to-day life, showcasing critical thinking skills.

CO4: Utilize interdisciplinary approaches, including ecology, economics, ethics, and policy, to developsolutions for environmental problems.

PO3: Social competence:

CO2: Apply knowledge of biodiversity to enhance social competence in addressing environmental challenges.

PO4: Research-related skills and Scientific temper:

CO3: Impart conceptual knowledge of the environment, including adaptations and interrelationships. CO5: Proficiently employ ecological field methods such as wildlife survey, biodiversity assessment, mathematical modelling, and ecological system monitoring, reflecting research-related skills and a scientific temper.

PO5: Trans-disciplinary knowledge

CO4: Use interdisciplinary approaches, integrating ecology, economics, ethics, and policy, to addressenvironmental problems and enhance trans-disciplinary knowledge.

PO6: Personal and professional competence

CO6: Apply the scientific method and quantitative techniques to describe, monitor, and understandenvironmental systems, demonstrating personal and professional competence.

PO7: Effective Citizenship and Ethics:

CO7: Evaluate current environmental issues and problems, including solutions and managementpractices, promoting effective citizenship and ethical considerations.

PO8: Environment and Sustainability:

CO1: Acquire knowledge about bioresources to contribute to environmental sustainability.

CO3: Impart conceptual knowledge of the environment, emphasizing adaptations and interrelationships to support environmental sustainability.

CO5: Be proficient in ecological field methods, contributing to biodiversity assessment and ecological system monitoring for sustainable environmental practices.

PO9: Self-directed and Life-long learning:

CO1: Foster self-directed and life-long learning by acquiring comprehensive knowledge aboutbioresources.

CBCS Syllabus as per NEP 2020 for F.Y.B.Sc. Environmental Science (2024 Pattern)

Name of the Programme	: B.Sc. Environmental Science
Programme Code	: USENV
Class	: F.Y.B.Sc.
Semester	: II
Course Type	: DSC-I (General) (Practical)
Course Code	: ENV-152-GEN
Course Title	: Environmental Science Practical-II
No. of Credits	:02
No. of Teaching Hours	: 60

Course Objectives:

- 1. To learn that adaptation allows organisms to survive and reproduce in the natural environment.
- 2. Understand and the importance of environment by accessing it impaction the human world.
- 3. To understand basic nature of soil.
- 4. To understand the environmental significance of water quality.
- 5. To understand the different types of ecosystems.
- 6. Develop an ability to handle the apparatus carefully and there sources wisely.
- 7. Develop scientific understanding of physical world.

Course Outcomes:

By the end of the course, students will be able to:

- **CO1.** Demonstrate a compressive understanding of the world biodiversity and the importance of its conservation.
- CO2. Understand the significance of various natural resources and its management.
- **CO3.** Evaluate hazards and risks in order to carry out a risk assessment.
- **CO4.** Students will use a verity of laboratory techniques to safely conduct chemical experiments and procedures.
- **CO5.**To understands verity of ecosystem of their own locality.

CO6.Describe the ecological value and consumptive use of ecosystem.

CO7.Students will have opportunity to work in research lab, bio fertilizer industry and can

also be bio-entrepreneurs.

Topics and Learning Points

- 1. Study of economical and medical values of plant species in local area.
- 2. Preparation of Media (Broth, Agar and Slant).
- 3. Classification of microorganisms by gram staining method.
- 4. Study of local terrestrial ecosystem
- 5. Draw the compound windrose from given data and interprets the graph using given information.
- 6. Estimation of carbon sequestration of college campus area
- 7. Preparation of digital herbarium
- 8. Case study related to invasive species.
- 9. To Study the ecological adaptation-Hydraphyte, Mesophytes, Epiphytes and xerophytes
- 10. Study of preparation of bio fertilizer.
- 11. Study of vegetation by quadrant method.
- 12. Estimation of NPP, GPP and R.
- 13. Study of fauna of terrestrial ecosystem.
- 14. Study of species interaction from forest area.
- 15. Visit of any ecosystem and submission of Excursion report is compulsory at the time of practical examination.

*Any other relevant practical related to syllabus.

References:

1. Environmental Science: A Practical Manual Book by G Lakshmi Swarajya and P Prabhu Prasadini (2018)

2. Environmental Chemical Analysis Laboratory Manual, Prepared by Dr. Erik Krogh, Dr. Chris Gill, Shelley Gellein, and Peter Diamente Department of Chemistry, 2018

- 3. Environmental Chemistry :S. e. Manahan
- 4. The Chemistry of Our Environment :R. A. Hom

Programme Outcomes (POs)									
Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
Outcomes									
CO1	3						2		
CO2		2							
CO3		2							
CO4				2					
CO5			3					3	
CO6					2				
CO7			3			3			3

Mapping of Program Outcomes with Course Outcomes

Justification for the mapping

PO1: Disciplinary Knowledge:

CO1:Demonstrateacomprehensiveunderstandingoftheworld'sbiodiversityandemphasizethe importance of its conservation within the disciplinary knowledge framework.

PO2: Critical Thinking and Problem solving:

CO2: Understand the significance of various natural resources and their management, demonstrating critical thinking and problem-solving skills.

CO3: Evaluate hazards and risks for effective critical thinking and problem-solving in the context of risk assessment.

PO3: Social competence:

CO5: Understand a variety of ecosystems in their own locality, contributing to social competence in environmental awareness.

CO7: Provide opportunities for students to work in research labs, bio-fertilizer industries, and explore bio-entrepreneurship, enhancing social competence.

PO4: Research-related skills and Scientific temper:

CO4: Use a variety of laboratory techniques for chemical experiments and procedures, show casing research-related skills and a scientific temper.

PO5: Trans-disciplinary knowledge

CO6: Describe the ecological value and consumptive use of ecosystems, integrating transdisciplinary knowledge.

PO6: Personal and professional competence

CO7: Provide students with opportunities to work in research labs, bio-fertilizer industries, and encourage bio-entrepreneurship, enhancing personal and professional competence.

PO7: Effective Citizenship and Ethics:

CO1: Demonstrate a comprehensive understanding of the world's biodiversity and its conservation, contributing to effective citizenship and ethical considerations.

PO8: Environment and Sustainability:

CO5: Understand the variety of ecosystems in their own locality, emphasizing environmental sustainability.

PO9: Self-directed and Life-long learning:

CO7: Provide opportunities for students to work in research labs, bio-fertilizer industries, and explore bio-entrepreneurship, fostering self-directed and life-long learning.

CBCS Syllabus as per NEP 2020 for F.Y.B.Sc. Environmental Science (2024 Pattern)

Name of the Programme	: B.Sc. Environmental Science
Programme Code	: USENV
Class	: F.Y.B.Sc
Semester	: 11
Course Type	: Open Elective (OE) (Practical)
Course Code	: ENV-153-OE
Course Title	: Environmental Management and Safety
No. of Credits	:02
No. of Teaching Hours	: 60

Course Objectives:

- 1. To understanding the Techniques of disaster management.
- 2. To identify and measuring the disaster risk.
- 3. To study natural and anthropogenic hazard.
- 4. To study techniques of disaster risk assessment.
- 5. To understand experimentation of disaster management.
- 6. To control and disaster and their consequences on nature and human being.
- 7. To study the need of environmental safety.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Students understood the fundamentals of disaster and management.
- **CO2.** Monitoring and evaluation of safety plan.
- **CO3.** Emerging first aid at disaster site.
- **CO4.** Disaster prevention at local level.
- **CO5.** Mitigation and management techniques for disaster management.
- CO6. First aid treatment for natural and anthropogenic hazard.
- CO7. Environment Health, Safety and Management System.

Topics and Learning Points

- 1. To study rules while handling chemicals in laboratory.
- 2. Introduction to first aid treatment for natural and anthropogenic hazard.
- 3. Demonstration of the fire safety.
- 4. Demonstration of respiratory personal protective equipments.
- 5. Demonstration of non respiratory personal protective equipments.
- 6. Preparation of disaster management plan for flood.
- 7. Monitoring of Noise level in college campus area.
- 8. Role of various agencies in Disaster Mitigation National and State level.
- 9. Disaster response Medical support, Rehabilitation, Reconstruction and Recovery.
- 10. To study disaster prevention at local level (Emergency Basis).
- 11. Post disaster management for snake bite.
- 12. To study Pre and post disaster management for LPG gas leakage.
- 13. Eco friendly practices for safe environment.
- 14. To study of food adulteration from chemical industry and their health hazard.
- 15. Visit to any institute for study of fire alarm system.

eferences:

1. Handbook for laboratory safety, Benjamin R. Sveinb jornsson and Sveinb jorn Gizurarson(2022)

2. Laboratory Safety Handbook, Fens Laboratory Safety Team, Sabancı University, 2016

Programme Outcomes (POs)									
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3								2
CO2		2							
CO3			3						
CO4		2					3		
CO5				2					
CO6						2			
CO7					2			3	

Justification for the mapping

PO1: Disciplinary Knowledge:

CO1: Acquire fundamental knowledge of disaster and management, emphasizing disciplinary knowledge in the field.

PO2: Critical Thinking and Problem solving:

CO2: Apply critical thinking in the monitoring and evaluation of safety plans related to disaster management.

CO4: Implement critical thinking skills in disaster prevention at the local level.

PO3: Social competence:

CO3: Demonstrate social competence through the application of emerging first aid techniques at disastersites.

PO4: Research-related skills and Scientific temper:

CO5: Apply research-related skills and a scientific temper in the development and implementation of mitigation and management techniques for disaster management.

PO5: Trans-disciplinary knowledge

CO7: Integrate trans-disciplinary knowledge in understanding Environment Health, Safety, and Management Systems related to disasters.

PO6: Personal and professional competence

CO6: Demonstrate personal and professional competence through the application of first aid treatment forboth natural and anthropogenic hazards.

PO7: Effective Citizenship and Ethics:

CO4: Integrate ethical considerations in disaster prevention at the local level, contributing to effectivecitizenship.

PO8: Environment and Sustainability:

CO7: Apply knowledge of Environment Health, Safety, and Management Systems to promote environmental sustainability in disaster management.

PO9: Self-directed and Life-long learning:

CO1: Acquire fundamental knowledge of disaster and management to foster self-directed and life-longlearning.

CBCS Syllabus as per NEP 2020 for F.Y.B.Sc. Environmental Science (2024 Pattern)

Name of the Programme	: B.Sc. Environmental Science
Programme Code	: USENV
Class	: F.Y.B.Sc
Semester	: 11
Course Type	: Skill Enhancement Course (SEC) (Practical)
Course Code	: ENV-154-SEC
Course Title	: Sustainable Agricultural Practices
No. of Credits	:02
No. of Teaching Hours	: 60

Course Objectives:

- 1) To understand how to make best use of the resources available.
- 2) To understand minimize use of non-renewable resources.
- 3) To understand how to protect and enhance the environment and natural resources.
- 4) To study to protect the economic viability of farming operations
- 5) To understand Protection of health and safety of farm workers, local communities and society.
- 6) To understand sustainable water and soil conservation practices
- 7) To study management of farm waste.

Course Outcomes:

By the end of the course, students will be able to:

- CO1. Students understood various cropping methods.
- **CO2.** Students understood modern agriculture practices
- CO3. Students understood management of farm waste in sustainable way.
- CO4.Students understood organic farming practices
- CO5.Learners will be aware about soil &water conservation
- CO6.Knowledge on working of urban farming techniques.

CO7.Students will have opportunity to work in Biofertilizer industry and canal so be

bio-entrepreneurs.

Topics and Learning Points

- 1. To study of crop rotation method for farming.
- 2. To study methods of preparation of compost.
- 3. To study of Vermicomposting of agricultural waste.
- 4. Estimation of soil moisture from given soil sample.
- 5. Preparation of bio-fertilizers- Neem formulation, BGA use
- 6. Preparation of bio-pesticides.
- 7. To study mulching procedure of farming.
- 8. To study drip & sprinkler irrigation system.
- 9. Demonstration of preparation of hydroponics farming.
- 10. Demonstration of practicing of no tillage farming.
- 11. Demonstration of preparation of vertical farming.
- 12. Planning of urban agriculture by terrace gardening.
- 13. Study visit to any nursery to understand their sustainable practices.

References:

- 1. Best Practices in Sustainable Agricultural Practices, Shroffs Foundation Trust 2016
- 2. Sustainable Agriculture, Ram Swaroop, Meena SCIENTIFIC PUBLISHERS (INDIA), 2019
- 3. A scheme and training manual on good agriculture practices for fruits and vegetables.

Mapping of Program Outcomes with Course Outcomes

Programme Outcomes (POs)									
Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
Outcome									
S									
CO1	3								
CO2		2							3
CO3				3			3		
CO4				2					
CO5					3			3	
CO6			2						
CO7						2			

Justification for the mapping

PO1: Disciplinary Knowledge:

CO1: Acquire disciplinary knowledge by understanding various cropping methods.

PO2: Critical Thinking and Problem solving:

CO2: Apply critical thinking skills to comprehend modern agriculture practices.

PO3: Social competence:

CO6: Gain knowledge on working urban farming techniques, contributing to social competence in sustainable agriculture.

PO4: Research-related skills and Scientific temper:

CO3: Understand the management of farm waste in a sustainable way, reflecting research-related skills and a scientific temper.

CO4: Comprehend organic farming practices, show casing a scientific temper.

PO5: Trans-disciplinaryknowledge

CO5: Increase awareness about soil and water conservation from a trans-disciplinary perspective.

PO6: Personal and professional competence

CO7: Provide students with opportunities to work in bio-fertilizer industries and explore bioentrepreneurship, enhancing personal and professional competence.

PO7: Effective Citizenship and Ethics:

CO3: Understand the management of farm waste in a sustainable way, contributing to effective citizenship and ethical considerations.

PO8: Environment and Sustainability:

CO5: Increase awareness about soil and water conservation, emphasizing environmental sustainability.

PO9: Self-directed and Life-long learning:

CO2: Apply critical thinking skills to comprehend modern agriculture practices, fostering self-directed and life-long learning.
