PANJAB UNIVERSITY CHANDIGARH- 160014 (INDIA)

(Estted. under the Panjab University Act VII of 1947-enacted by the Govt. of India)

FACULTY OF SCIENCE
UNDERGRADUATE PROGRAMS
(4 Years Programme as per NEP-2020)

SYLLABI

of

Value Added Course (VAC)
in
Environment Science
For
Ist & IInd Semester

Department of Environment Studies, Panjab University, Chandigarh

Academic Session (2023-2024)

PREAMBLE

The Department of Environmental Studies is one of the vital departments of the Panjab University, Chandigarh that runs multidisciplinary Masters course with focus on the emerging areas of Environmental Sciences. The course content is kept up-to-date with the latest development in the area of study. The theory, practical, project work and training activities of this programme prepares the student to acquire knowledge, skills and expertise on specified subjects along with the integrated knowledge of all relevant disciplines. The course provides valuable hands-on experience. The students are regularly exposed to various aspects of industry requiring environmental attention. The department also conducts educational trips to the related production units and research institutions.

The Department has achieved good visibility in India and abroad. The faculty and the research students have fetched many national and international awards. Faculty members have been members of editorial boards of various national and international journals. Faculty members have been publishing research papers in relatively high impact journals, and supervising students for research in a variety of environmental aspects.

The Department has suitably developed the laboratory facilities with many analytical equipments for teaching, demonstration and research. It has its own library with latest books and reading material in the field of Ecology, Pollution, Environment Science, Waste Management, Environment Biology, Environment Management, Bio-statistics, Research Methodology, Biodiversity and Conservation, Environmental Biotechnology, Geo-environment, and Biological Sciences. The facility of Visual aids like LCD projector, Slide and Over-head projectors are available for imparting instructions to the students. Students are encouraged to use these aids even for their seminars. With the funds from UGC and DST, the department has procured equipments like HPLC, UV-VIS Spectrophotometer, BOD Incubator, Air Quality Monitor, Thermo-hygrometer, Dust track, and Gas Analyzer.

The department has 46 students enrolled in its Ph.D course. To date, the Department has produced a number of NET qualified students. The students who have successfully completed the course are placed very well in various reputed institutes and companies both in India and abroad.

ENVIRONMRNT SCIENCE

VALUE ADDED COURSE

COURSE STRUCTURE

SEMESTER I (Credits = 02, Marks = 50)		SEMESTER II (Credits = 02, Marks = 50)	
COURSE CODE	**COURSE TITLE**	**COURSE CODE**	**COURSE TITLE**
BENV-VAC-1	**ENVIRONMENTAL CONCEPTS**	**BENV-VAC-2**	**ENVIRONMENTAL CONVERSATION & MANAGEMENT**

CREDIT DISTRIBUTION

COURSE CODE & TITLE	CREDITS	CREDIT DISTRIBUTION OF COURSE			ELIGIBILITY CRITERIA	PRE-REQUISITE OF THE COURSE
		LECTURE	TUTORIAL	PRACTICAL/ FIELD WORK		
BENV-VAC-1: ENVIRONMENTAL CONCEPTS	02	02	0	0	PASS IN CLASS 12^{TH}	NIL
BENV-VAC-2: ENVIRONMENTAL CONCEPTS	02	02	0	0	PASS IN CLASS 12^{TH}	NIL

IMPORTANT NOTE:

1. Course will be offered by Department of Environment Studies for students of other departments.
2. Course will be offered by the Department of Environment Studies, only if, a minimum of 10 students enrol for the course.
3. The evaluation criteria for Semester 1 and Semester II VACs will be the same.

PANJAB UNIVERSITY, CHANDIGARH

OUTLINES OF TESTS & SYLLABI FOR VALUE ADDED COURSE (VAC) IN ENVIRONMENT SCIENCE, EXAMINATION: 2023-2024

(4 Years Programme as per NEP-2020)

OUTLINES OF TESTS

VALUE ADDED COURSE

Semester I

Theory Paper:		
BENV-VAC-1	Environmental Concepts	50 Marks (02 credits)
Practical:		
BENV-VAC-1	Environmental Concepts	0 Marks (0 credits)

Semester II

Theory Paper:		
BENV-VAC-2	Environment Conservation and Management	50 Marks (02 credits)
Practical:		
BENV-VAC-2	Environment Conservation and Management	0 Marks (0 credits)

GUIDELINES:

1. Course will be offered by Department of Environment Studies for students of other departments.
2. Course will be offered by the Department of Environment Studies, only if, a minimum of 10 students enrol for the course.

EVALUATION

1. There shall be one Mid Term Examination viz. internal assessment of **20% of the total marks (10 marks)** in each semester.
2. End-semester examination will be of **80% of the total marks (40 marks).**
3. The final examination shall be of **3 hours duration.**

PATTERN OF END-SEMESTER QUESTION PAPER

(i) There will be **Five** questions in all. The candidate will be asked to attempt **three** questions.
(ii) One Compulsory question (consisting of short answer type questions) covering whole syllabus. There will be no choice in this question. First question will be of **15 marks.**
(iii) The remaining **Four** questions will be in **Two UNITS**, each unit comprising of two questions. The questions will be of equal weightage (**12.5 marks**).
(iv) Students will attempt one question from each UNIT and the compulsory question.

COMPUTATION OF SEMESTER GRADE POINT AVARAGE (SGPA)

COURSE	CREDIT	GRADE POINT	CREDIT POINT
	2	X=(MARKS%/10)	2 x X

SGPA=TOTAL CREDIT POINST IN THE SEMESTER/TOTAL CREDITS

Grade and Grade Points:

Letter Grade	O	A^+	A	B^+	B	C	P	F	Ab
Grade Point	10	9	8	7	6	5	4	0	0

VALUE ADDED COURSE

IN

ENVIRONMENT EDUCATION

(4 Years Programme as per NEP-2020)

SEMESTER I

ENVIRONMRNT SCIENCE
SEMESTER I

VALUE ADDED COURSE

Course Title: Environmental Concepts **Credits: 02**
Course Code: BENV-VAC-1 **Contact hours: 30 Hours**

THEORY

Learning objectives: *The course intends to make the students understand:*

1. *Concepts and structure of our environment.*
2. *Structure of our ecosystem, services provided and their significance to humans.*
3. *Biodiversity and its importance.*
4. *Types of pollution and measures for their control.*

Course outcomes: *After completion of the course, the students will be able to*

1. *Develop critical thinking on various dimensions of the environment.*
2. *Develop pro-environmental attitude among students so that they can adopt and propagate for eco-friendly lifestyle for environmental protection and conservation of biodiversity.*
3. *Develop scientific attitude to identify relevant environmental issues, analyse the various underlying causes, evaluate the prices and policies, and develop framework to make informed decisions.*

Unit 1: Introduction to Environment Science, Natural Resources, Ecosystem and Biodiversity **15 hours**

1.1. Scope, importance and multidisciplinary nature of Environmental Science
1.2. Natural resources—concept, classification, distribution, causes of depletion and conservation
1.3. Concept of ecosystem, trophic structure and function of an ecosystem,
1.4 Major Ecosystems (terrestrial, aquatic and artificial)— biotic interactions, biomes and ecological succession.
1.5 Biodiversity—definition, values, hotspots of biodiversity, threats, causes and effects of biodiversity loss

Unit 2: Climate Change and Environmental issues **15 Hours**

2.1 Climate Change: causes, Consequences, Green House Effect and Global Warming
2.2 Environment pollution: Sources, types of pollution, causes, consequences and control (Air, Water, Soil & noise, microbial)
2.3 Radiations, Nuclear and Technological Hazards

2.4 Population Growth, Disaster, Pandemic and Human Health Risks

ESSENTIAL READINGS

1. Cunningham, W. P. & Cunningham, M.A. (2009). *Environmental science: a global concern*. Glencoe/McGraw-Hill school pub.
2. Botkin, D. B. & Keller, E. A. (2005). *Environmental science: earth as a living planet*. John wiley & sons.
3. Keen, M., Brown, V. A., Dybal, R. (2005). *Environmental science: toward a sustainable future* (1st edition). Routledge.
4. Bharucha, E. (2019). *Text Book for environmental studies*. Universities press (India) private limited.
5. Kaushik & Kaushik. (2018). *Perspectives in environmental studies*. New age international Publishers.
6. Basu, M. & Xavier, S. (2018). *Fundamental of environment studies*. Cambridge university press, Kolkata.
7. Vanramliana *et al.,* (2015). *A text book of environmental science*. Scientific book centre, Guwahati.
8. Daniel, D.C. (2014.) *Environment science.* Jones and bartlett publishers, London.
9. Prasad, G. (2008). *Handbook of environment science*. Discovery publishing house, New Delhi.
10. Rajagopalan (2019). *Environment studies: from crisis to cure*. Oxford university press, New Delhi.
11. Saha, T.K. (2013). *Ecology and environmental biology*. Books & allied (p) Ltd. Kolkata.
12. Santra, S.C. (2018). *Environment science.* New Central book agency (P) Ltd. Kolkata.
13. Sharma, P.D. (2017). *Ecology and environment.* (10^{th} Revised Edition), Rastogi Publication.
14. Allaby, M. (2019). *Basics of environmental science*, Routledge, London.

VALUE ADDED COURSE

IN

ENVIRONMENT EDUCATION

(4 Years Programme as per NEP-2020)

SEMESTER II

ENVIRONMRNT SCIENCE
SEMESTER II

VALUE ADDED COURSE

Course Title: Environment Conservation and Management **Credits: 02**
Course Code: BENV-VAC-2 **Contact hours: 30 hours**

THEORY

Learning objectives: *The course intends to make the students understand:*

1. *Concepts and design of various environment conservation and management strategies.*
2. *Environmental laws and initiatives taken by the government to protect natural resources and environment*

Course outcomes: *After completion of the course, the students will be able to*

1. *Develop scientific attitude to identify environmental issues, analyse the various underlying causes, evaluate policies, and develop innovative start-ups to alleviate the environmental problems.*
2. *Collaborate with environmental engineers, planners, technicians, and other specialists, and experts to address environmental problems*

Unit 1: Environment Conservation and Regulation **15 hours**

1.1. Concepts of environment conservation: aim, need, to conserve natural resources and biodiversity —soil water, air, wildlife and forests

1.2. Environment policies and legislation: History of international climate change policies. United Nation Framework Convention on climate change (UNFCCC), The United Nations Conference on Environment and Development, Intergovernmental Panel on Climate Change (IPCC), Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD), Agenda 21

1.3 Conservation of biodiversity: *In-situ* and *Ex-situ* conservation of biodiversity; Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context

Unit 2: Environment Management **15 hours**

2.1 Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan

2.2 Solid and hazardous waste management: Classification, salient features as per Indian legislation, collection, storage, transport and disposal; Control measures of urban and industrial waste

2.3 Waste water treatment systems: Principle, design and working and importance

2.4 Air quality monitoring and Modelling: Definition, design and working and importance

2.5 Remote sensing and GIS in environment management: Disaster management: floods, earthquake, cyclones and landslides.

2.6 Sustainable alternatives: Definition, examples from Indian case studies: Bioremediation technologies, landfills.

ESSENTIAL READINGS

1. Divan, S. & Rosencranz, A. (2002). *Environmental law and policy in India*. Oxford university press.
2. Edward, G.R. & Pandit, M.K. (2013). *Threats from India's himalaya dams*. Science, 339: 36-37.
3. Gleeson, B. & Low, N. (eds.) (1999). *Global ethics and environment*. Routledge.
4. Glejck, P. H. (1993). *Water in crisis. pacific institute for studies in dev., environment & security*. Stockholm Env. Institute, Oxford university press.
5. Groom, M.J., Meffe, G.K. & Carroll, C. R. (2006). *Principles of conservation biology*. Sunderland: sinauer associates.
6. McCully, P. (1996). *Rivers no more: the environmental effects of dams*. Zed books (pp. 29-64).
7. Nandini, N. (2019). *A text book on environmental studies* (AECC). Sapna book house, Bengaluru.
8. Odum, E.P., Odum, H.T. & Andrews, J. (1971). *Fundamentals of ecology*. Philadelphia: Saunders.
9. Pepper, I.L, Gerba, C.P. & Brusseau, M.L. (2011). *Environmental and pollution science*. Academic press.
10. Rao, M.N. & Datta, A.K. (1987). *Waste water treatment*. Oxford and IBH publishing Co. pvt. ltd.
11. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. (2012). *Environment* (8th edition). John wiley & sons.
12. Sengupta, R. (2003). *Ecology and economics: an approach to sustainable development*. Oxford university press.
13. Singh, J.S., Singh, S.P. and Gupta, S.R. (2014). *Ecology, environmental science and conservation*. S. Chand publishing, New Delhi.
14. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). (2013). *Conservation Biology: voices from the tropics*. John Wiley & Sons.