



Different departments of the university teach courses/subjects on climate science and/or environmental sustainability. Environmental Science is a mandatory subject for the students and various other subjects are also included in the syllabus of different disciplines which are related to climate science and/or environmental sustainability. Number of value added courses, vocational courses, and skill enhancement courses are also related to environmental sustainability.

Course/subject	Link to the document
BSc Chemistry/Green Chemistry	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/LOCF_UG.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/LOCF_UG.pdf</a>
MSc Chemistry/Environmental Chemistry	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/CBCS-PG.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/CBCS-PG.pdf</a>
BTech Chemical Engineering	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/Final Year Scheme and Syllabus 2023-24.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/Final Year Scheme and Syllabus 2023-24.pdf</a>
	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/third year scheme and syllabus 2024-25 NEP.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/third year scheme and syllabus 2024-25 NEP.pdf</a>
	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/02092023030119_Final Year Scheme and Syllabus with mapping AICTE 2021-22.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/02092023030119_Final Year Scheme and Syllabus with mapping AICTE 2021-22.pdf</a>
	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/Second Year Scheme and Syllabus with mapping 2021.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/Second Year Scheme and Syllabus with mapping 2021.pdf</a>
MTech Chemical Engineering	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/M_Tech_2021-22.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/M_Tech_2021-22.pdf</a>
BSc Forestry Environmental Sciences	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/B.Sc. Forestry NEP 2023-24.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/B.Sc. Forestry NEP 2023-24.pdf</a>
BSc Forestry and Environmental Sciences	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/M.Sc. Forestry CBCS 2023-24.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/M.Sc. Forestry CBCS 2023-24.pdf</a>
PhD program in Forestry and Environmental Sciences	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/Ph.D. in Forestry Environmental Sciences.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/Ph.D. in Forestry Environmental Sciences.pdf</a>
BSc Rural Technology	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/NEP_I_II semester UG Syllabus 22_March 2024_for_website.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/NEP_I_II semester UG Syllabus 22_March 2024_for_website.pdf</a>
MSc Rural Technology	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/12012021042316_PG_Syllabus_as_per LOCF 2021-22.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/12012021042316_PG_Syllabus_as_per LOCF 2021-22.pdf</a>
PhD in Rural Technology	<a href="https://www.new.ggu.ac.in/attachments/attachments/course/RT_Ph_D_Syllabus_as_per LOCF with POs_PSOs_COs.pdf">https://www.new.ggu.ac.in/attachments/attachments/course/RT_Ph_D_Syllabus_as_per LOCF with POs_PSOs_COs.pdf</a>

**Department of Forestry, wildlife & Environmental Sciences**  
**Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh**

**Value Added Course for UG I Semester As per NEP 2020 Guidelines of the University**

**Course Curriculum**

**VAC-1: Environmental Education**

**Credit- 2**

Sub Code	L	T	P	Duration	IA	ESE (T)	Total	Credits
FOUAVAT1	2	-		2 hours	30	70	100	2

**Course objectives:**

1. Develop a critical understanding of the environmental issues of concern
2. Understand the concept of natural resources; identify types of natural resources, their distribution and use with special reference to India.
3. Explain sustainable development, its goals, targets, challenges and global strategies for sustainable development.
4. To develop scientific, interpretive and creative thinking skills in the students about environment.
5. To explore the problems that we face in understanding our nature that correlate with socio-economical solution for sustainable development.

**Unit I. Introduction to environmental studies, Humans and the Environment-**

Multidisciplinary nature of environment, scope and importance, Man-environment interaction: Population growth and natural resource exploitation. Concept of sustainability and Sustainable Development Goals (SDGs).

**Unit II- Natural Resources and Environment Pollution**

Overview of natural resources: Classification of natural resources, Land resources, water resources, Energy resources; Environmental pollution types, causes, effects, controls; Solid waste management, 3R Principle.

**Unit III- Biodiversity Conservation and environmental issues**

Biological diversity concept; hot spots; Endangered and endemic species of India. Threats to biodiversity, man-wildlife conflicts; Conservation of biodiversity, Environmental issues at local, regional, and global scale.

**Unit IV- Ecology & Ecosystems**

Structure and function of ecosystem, Energy flow, food chains, food webs and ecological succession. Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems

**Unit V. Climate Change: Impacts, Adaptation and Mitigation**

Understanding climate change: greenhouse gas emissions, global climate change, temperature, rainfall, net zero targets for the future; Energy efficiency measures.

**Unit VI: Environment Management, Environmental Policies, Acts, treaties and regulations**

Introduction to environmental laws and regulation, Constitutional provisions, The Air (Prevention and Control of Pollution) Act; The Environment (Protection) Act, 1986; International agreements: Montreal and Kyoto protocols; UNFCCC; Kyoto Protocol.

**Chapter VII: Human Communities and the Environment**

Human population growth: Impacts on environment, Resettlement and rehabilitation of industrial and mining projects; Disaster and its management, major Environmental movements.

**Suggested readings**

1. Erach Bharucha (2021). Text Book OF ENVIRONMENTAL STUDIES FOR UG 3RD Edition. Orient Blackswan Pvt. Ltd. ISBN 9389211786
2. Sharma PD and Sharma PD. (2012). Ecology and Environment. Publisher: Rastogi Publications, ISBN:9788171339051, 8171339050
3. Deswal A. And Deswal S. (2013). A Basic Course In Environmental Studies, Dhanpat Rai & Co. ISBN 9788177000023
4. इराक भरुचा (२०२१). एन.बी.आई एस. पर्यावरण अध्ययन. 9789354426001 तृतीय, ३१६ पृष्ठ. संस्करण भाषा हिंदी ओरिएंट ब्लैक स्वान प्रा. लिमिटेड.
5. Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press.
6. Sinha, N. (2020) Wild and Wilful. Harper Collins, India.
7. Bhagwat, Shonil (Editor) (2018) Conservation and Development in India: Reimagining Wilderness, Earthscan Conservation and Development, Routledge.
8. Krishnamurthy, K.V. (2003) Textbook of Biodiversity, Science Publishers, Plymouth, UK
9. Miller, G. T., & Spoolman, S. (2015) Environmental Science. Cengage Learning.
10. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI).
11. [www.ipcc.org](http://www.ipcc.org); <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>.

**Course Outcomes:**

1. Have awareness on issues with environmental pollution, their effects and possible solutions.
2. Gain knowledge of natural resources, their significance, and the effects of human activity on the resources in environment.
3. Be familiar with biodiversity conservation and its significance.
4. Understand the need of sustainable development for future and become competent and socially responsible citizen of India.

## **Open Elective: ENVIRONMENT MANAGEMENT AND SUSTAINABILITY**

### **CR.4 (3+1)**

#### **Course Objectives:**

1. Creating awareness about environmental problems. Developing an attitude of concern for environment.
2. To impart knowledge about the forest functions on global warming and environmental pollutions.
3. To acquire knowledge on national and international treaties, about the international environment conservation policies and agencies engaged in climate change.

#### **Theory**

Environment: Definitions and concepts of environment, Environment Pollution: Types, classification and national and international Environmental standards of important pollutants.

Air pollution: Major pollutants and their sources. Monitoring of gaseous pollutants and particulate matter, Biological abatement methods. Water Pollution: Important pollutants source, impact of heavy metals. Treatment technologies for industrial effluents/wastewater.

Soil pollution: Heavy metal toxicity in soil, Impact of pesticides, industrial waste and fertilizers on soil. Climate changes and Global Environmental Problems: Causes and impacts, Impact of climate changes on Indian forest. Concept of Adaptability and vulnerability, Bio-manipulation and Bioremediation.

Climate change history, Institutional developments towards climate change. Recent developments in global climate changes, Changes in source and sinks of carbon in the last few decades. Global warming potentials of major GHG's. Effect of climate change on: Ocean, Soil, Forest, Biodiversity Carbon Footprint: concepts, methods of assessment

International agreements and policies for earth care, Ramsar Convention, stock home convention, IPCC, Kyoto protocol, COPs, Paris Summit, Montreal Protocol. Conservation policies of The Ministry of Environment, Forest and Climate change govt. of India, NAPCC, Convention on Biological Diversity (CBD), G20 summit 2023, National Biodiversity Action Plan (NBAP), Nagar Van Udyan Scheme, Swachh Bharat Abhiyan, Green Skill Development Programme, National River Conservation Programme, Green India Mission, and National Afforestation Programme.

## **Practical**

Impact of particulate matter on environment, Impact of coal mining on environment Impact of cement pollution in environment. Effect of effluent from several industries on environment. Reclamation of mining wastes with microorganisms. Bio-accumulation studies on metals by microorganisms. Assessment of environmental impact on polluted sites. Assessing the awareness of environmental regulation and control methods, Impact of power stations on plant, microorganisms, animals and soils ecosystems, EIA of polluted river ecosystem, Environmental Impact Assessment.

## **Suggested Readings**

Anonymous (2006) .Report of the National Forest Commission. Govt. of India, New Delhi.  
E. Claussen, V. A. Cochran, and D. P. Davis. (2001). Climate Change: Science, Strategies, & Solutions, University of Michigan.  
Huxley P. (1999). Tropical Agroforestry. Blackwell Science.  
Koskela J, Buck A & Teissier du Cros E. (2007). Climate Change and Forest Genetic Diversity: Implications for Sustainable Forest Management in Europe. Biodiversity International; Rome, Italy.  
Streck, C et al, (2006). Climate Change and Forests Emerging Policy and Market Opportunities Today & Tomorrow's Printers and Publishers New Delhi.

## **Course Outcome:**

1. Students will be able to analyze and assess the pollutions and their sources.
2. Students understand on the role of forest on pollution control.
3. Students will be able to EIA for various agencies and know about the international and national organizations treaties.



गुरु घासीदास विश्वविद्यालय  
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(A Central University established by the Central Universities Act, 2009, No.25 of 2009)

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Bilaspur, Date- 07 AUG 2023

To whom so ever it may concern

This is to certify that the University offers compulsory courses in 33 Under Graduate (UG) programmes under Ability Enhancement Courses (AEC) that teach specifically on climate science and/or environmental sustainability as a part of the curriculum. Further, the Department of Forestry, Wildlife & Environmental Science provides undergraduate/postgraduate degrees in B. Sc. Forestry, M. Sc. Forestry & Environmental Sciences, Ph. D.

  
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