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GU/Acad –PG/BoS - CDT /2025-26/729 Date: 28/01/2026

**CIRCULAR**

The syllabus of the Change of Discipline (CDT) for **Master of Science in Environmental Science** Programme, approved by the Academic Council in its meeting held on 7th November 2025 is attached.

The Dean/Vice-Dean (Academic) of the School of Earth, Ocean and Atmospheric Sciences and the Principals of all the affiliated Colleges are requested to take note of the above and bring the contents of this Circular to the notice of all concerned, including students aspiring to pursue the Master's Programmes.

ASHWIN V LAWANDE
Digitally signed by ASHWIN V LAWANDE
Date: 2026.01.28 15:35:48 +05'30'

(Ashwin V. Lawande)
Deputy Registrar – Academic

To,
1. The Dean, School of Earth, Ocean and Atmospheric Sciences, Goa University.
2. The Vice-Dean (Academic), School of Earth, Ocean and Atmospheric Sciences, Goa University.
3. Principals of all the affiliated Colleges.

Copy to:
1. Controller of Examinations, Goa University.
2. Assistant Registrar (Admissions), Goa University.
3. Assistant Registrar Examinations (UG/PG), Goa University.
4. Director, Directorate of Internal Quality Assurance, Goa University for uploading the Syllabus on the University website.

GOA UNIVERSITY

# SYLLABUS FOR CHANGE OF DISCIPLINE TEST (CDT)
# FOR MASTER OF SCIENCE IN ENVIRONMENTAL SCIENCE PROGRAMME

**Effective from AY: 2026-2027**

| Modules | Content |
|---|---|
| **Module 1:** | **Natural Resources** |
| | Renewable and Non-Renewable resources: natural resources and associated problems; Forest Resources: use and over-exploitation, deforestation, case studies. Timber extraction, dams and their effects on forests and tribal people; Water Resources: use and over-exploitation of surface and ground water; floods, droughts, conflicts over water, dams-benefits and problems; Mineral Resources: use and exploitation, environmental effects of extracting and using mineral resources; case studies related to mining and its effect on siltation and loss of biodiversity; Food Resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, climate-related effects; Energy Resources: growing energy needs, renewable and non-renewable energy sources, use of alternative energy sources, case studies; Land Resources: land as a resource, land degradation, man-induced landslides, coastal erosion, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles. |
| **Module 2:** | **Ecosystems** |
| | Concept of an ecosystem, structure and functions of ecosystems; producers, consumers and decomposers; energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramid; Types, features, structure and functions of the following ecosystems: forest ecosystems, grassland ecosystem, desert ecosystem, aquatic ecosystems: ponds, streams, lakes, rivers, oceans, coastal zone, estuaries. |
| **Module 3:** | **Biodiversity and its Conservation** |
| | Definition of biodiversity, genetic, species and ecosystem diversity; bio-geographical classification of India; value of biodiversity - consumptive use, productive use, social, ethical, aesthetic and option values; biodiversity at global, national, regional and local levels; India as a mega-diversity nation; hotspots of biodiversity; threats to biodiversity - habitat loss, poaching of wildlife, man-wildlife conflicts, bio-invasion, and over exploitation; endangered and endemic species of India with examples; conservation of biodiversity- in-situ and ex-situ conservation, role of biotechnology in conservation of biodiversity; Objectives and scope of Environment |



**Approved by: Academic Council on 7th November 2025**

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|---|---|
| | (Protection) Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Forest Conservation Act, Wildlife Protection Act, Forest Rights Act and Biodiversity Act; Issues involved in enforcement of environmental legislation; public awareness; Environmental movements and conventions; Awareness and education on environmental issues. |
| **Module 4:** | **Environmental Pollution and Disaster** |
| | Causes, effects and measures to control air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear hazards; waste – types, causes, effects; waste management –solid, sewage and effluents; measures to control industrial and urban wastes; fertilizer-pesticide problems, water logging, effect of salinity on food production; role of an individual in prevention of pollution; climate change, global warming, acid rain, ozone layer depletion, wasteland reclamation; consumerism and associated waste products; Minamata disease; *Itai Itai* disease, mining hazards; disaster mitigation (Case study: Bhopal gas tragedy) and management-floods, droughts, earthquakes, landslides, cyclones, Tsunami; nuclear accidents. |
| **Module 5:** | **Environment and Social Issues** |
| | Population growth, variation among nations; population explosion and stress on resources; environment and human health; human rights; value education; women and child welfare; role of Information Technology in environment and human health; From unsustainable to sustainable development; urban problems related to energy; water conservation, rainwater harvesting, watershed management; resettlement and rehabilitation of people - problems and concerns, case studies; environmental ethics - issues and concerns; types of tourism; mass tourism and environment - aspects of degradation and exploitation, physical and social impacts; examples at local, regional, national and international levels; sustainable tourism. |
| **References/ Readings:** | 1. Agarwal, S. K. (2019). *Environmental Studies: Principles and Practices*. APH Publishing Corporation, New Delhi, India.<br>2. Botkin, D. B., & Keller, E. A. (2020). *Environmental Science: Earth as a Living Planet* (10th ed.). John Wiley & Sons, Hoboken, NJ.<br>3. Cunningham, W. P., & Cunningham, M. A. (2017). *Environmental Science: A Global Concern* (14th ed.). McGraw-Hill Education, New York, NY.<br>4. Dash, M. C. (2017). *Fundamentals of Ecology* (3rd ed.). McGraw-Hill Education, New Delhi, India.<br>5. Miller, G. T., & Spoolman, S. E. (2021). *Environmental Science: Sustaining Your World* (4th ed.). Cengage Learning, Boston, MA.<br>6. Odum, E. P., & Barrett, G. W. (2005). *Fundamentals of Ecology* (5th ed.). Cengage Learning India, New Delhi, India.<br>7. Raven, P. H., Berg, L. R., & Hassenzahl, D. M. (2015). *Environment* (9th ed.). John Wiley & Sons, Hoboken, NJ.<br>8. Sharma, P. D. (2022). *Ecology and Environment* (15th ed.). Rastogi Publications, Meerut, India.<br>9. Singh, J. S., Singh, S. P., & Gupta, S. R. (2014). *Ecology,* |

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| | *Environmental Science and Conservation*. S. Chand Publishing, New Delhi, India.<br>10. Withgott, J., & Laposata, M. (2021). *Environment: The Science Behind the Stories* (7th ed.). Pearson Education, Boston, MA. |