

Government Degree College Baramulla

SEMESTER 3rd

MAJOR/MINOR

Subject: Environmental Science
W.E.F. Academic Session 2022

Title: Physical Environment
BES22C301

Course Code:

Credit: 04 Theory+02 Practical

Contact Hours: 64 (T) +64 (L)

Part-I: Theory (4 Credits)

Course Objectives

- Identify the physical and chemical divisions in Earth's outer layers.
- Understand that the lithospheric plates are buoyant, and that this buoyancy controls the relationship between crustal elevation, crustal thickness, and crustal density.
- Compare and contrast the three types of plate boundaries and describe the three main ways boundaries interact: spreading apart, coming together, and sliding past one another.
- Describe the processes that occur at divergent boundaries and explain how new ocean floor is created.
- Describe the processes that occur at convergent boundaries and explain how crust is recycled and continents are built.
- Describe the motion along transform boundaries and compare and contrast the two principal types of transform faults.
- Describe the enigmatic volcanic regions known as hotspots and explain how they can be used to track the movement of plates.
- Compare and contrast the three types of force that may propel plates.
- Recognize that groundwater is a vital source of accessible freshwater
- Explain the global water budget and cycle.
- Describe the various physical properties of water.
- Describe how groundwater forms below the water table
- Describe how the movement of groundwater through soluble rock creates caverns and distinctive surface topography
- Understand the characteristics of oceanic circulation, the process and its patterns.
- Describe tides and its patterns.
- To develop knowledge regarding the origin, evolution, structure and composition of atmosphere.
- Describe the basic understanding the of air currents and polar atmosphere
- Understand the basics of climate science
- Describe the various meteorological parameters, factors affecting climate and the different climatic zones of the earth.
- Understand the green-house effect.
- Understand the sampling procedure for water quality analysis, soil quality analysis and soil profiling.
- Analysis of water and soil quality.
- Ecological evaluation of a micro-climatic zone.

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- Preliminary scientific writing based on project report.

Course Outcomes

- Gain knowledge about earth's, interior, tectonic and structural evolution.
- Describe the theories and fundamental concepts of tectonic and geomorphology.
- Acquire knowledge about the types of folds and faults and describe the buoyancy of the tectonic plates.
- Critical appraisal of continental drift and crustal mobility.
- Describe the processes involved in formation of ocean ridges, subduction zones and orogenic belts.
- Develop the skills of identification of earth features and correlation between them.
- Describe the physical parameters of the water in liquid, solid and gaseous form.
- Quantify the global water budget and discuss various stages of the hydrological cycle with residence time of water in each compartment.
- Discuss the phenomena of global oceanic system, its types and its benefits.
- Explain the origin of tides, its characteristics and various tidal patterns.
- To provide understanding the atmospheric evolution, composition, structure and the forces that drive atmospheric motions.
- To impart the knowledge of the typical vertical variation of atmospheric variables used to quantify the atmospheric state.
- Student can demonstrate the knowledge of the physical and optical properties of atmosphere.
- To discuss the various concept of atmospheric dynamics and atmospheric variation at the poles
- Explain the key concepts of climate and weather.
- Describe the various drivers that drive the climatic patterns and variation and resultant climatic zones.
- Evaluate the causes and concerns of the green-house effect.
- Demonstrate knowledge regarding the various soil horizons.
- Demonstrate the various procedures and precautions to be undertaken while sampling water and soil for quality analysis.
- Understanding of the basic principle and evaluation of water and soil samples for quantification of various quality parameters.
- Evaluation of the ecology of a micro-climatic zone and documentation of the observations.
- Developing skills related to writing of scientific project reports based on data generated from analysis of water samples collected from various areas/depths of a zone/district/river system/lake/pond.

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Unit I: Lithosphere

16 hours

- 1.1 Origin and structure of earth
- 1.2 Rheological behaviour of lithosphere
- 1.3 Continental drift and plate tectonics
- 1.4 Ocean ridges, subduction zones and orogenic belts
- 1.5 Precambrian tectonics and super continents

Unit II: Hydrosphere and Cryosphere

16 hours

- 2.1. Physical properties of water in its various forms
- 2.2. Global water budget and Hydrological cycle
- 2.3. Groundwater, Glaciers and Polar ice caps
- 2.4. Characteristics of oceanic circulation (Gulf Stream, North Atlantic Drift, Labrador Current)
- 2.5. Tides: Formation and Pattern

Unit III: Atmosphere

16 hours

- 3.1 Origin and evolution of atmosphere
- 3.2 Atmosphere: Composition and Stratification
- 3.3 Physical and optical properties of atmosphere
- 3.4 Basic concept of air currents
- 3.5 Concept of polar atmosphere

Unit IV: Climate

16 hours

- 4.1. Concept of meteorological parameters
- 4.2. Weather, climate and microclimate
- 4.3. Factors affecting climate
- 4.4. Climatic zones of earth
- 4.5. Greenhouse effect as a natural phenomenon

Unit V & VI: Laboratory Course

32 hours

1. Study of soil profile of a specific area.
2. Determination of moisture, alkalinity, organic matter and organic carbon in different soil samples.
3. Determination of various parameters (Transparency, CO₂, DO, alkalinity and hardness) in different water samples.
4. Ecological Tour to a different microclimatic zone and preparation of tour report.
5. Student research project- Preliminary water quality analysis and preparation of project

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report in light of available scientific literature.

Suggested Reading:

1. Ahmad, E.(2001): Geomorphology, Kalyani Publishers, New Delhi.
2. Ahmad, E.(2001): Physical Geography (Reprint), Kalyani Publishers, New Delhi
3. R.W. (2011): Geosystems: An Introduction to Physical Geography, Prentice Hall, New Jersey.
4. Critchfield, H. (1975): General Climatology, Prentice Hall, New York.
5. Dayal, P. (1996): A Textbook of Geomorphology, Shukla Book Depot, Patna.
6. Gabler, R.E., Pettersen, J.F., and Trapasso, L.M. (2006): Essentials of Physical Geography (8th Edition),Cenegage Learning, USA.
7. Grald, S. (1980): General Oceanography, John Willey & Sons, New York.
8. Hugget, R. J. (2003): Fundamentals of Geomorphology, Routledge, London.
9. Hugget, R. J. (2009): Physical Geography: The Key Concepts, Taylor and Francis, USA.
10. Kale, V.S. and Gupta Abhijit (2001): Introduction to Geomorphology, Orient Longman, Calcutta.
11. Lal, D.S. (2005): Climatology, Sharda Pustak Bhawan, Allahabad.
12. Lal, D.S. (2009): Physical Geography, Sharda PustakBhawan, Allahabad.
13. Malik, A. (2008): Causes of Climate Change, DVS Publ., New Delhi.
14. Negi, B.S. (2002): Climatology and Oceanography, Kedar Nath Ram Nath, Meerut.
15. Negi, B.S. (2000): Physical Geography, Kedar Nath Ram Nath, Meerut
16. Pettersen, J.F., Sack, D., and Robert, E. (2010): Fundamentals of Physical Geography, Cenegage Learning, USA.
17. Sharma, Y.K. (2007): Physical Geography, Lakshmi Narain Agarwal, Agra.
18. Strahler, A.N. and Strahler, A.H. (1992): Modern Physical Geography, John Willey & Sons, New York.
19. Thompson, R.D. et al., (1986): Processes in Physical Geography, Longman, London.
20. Standard Methods for the Examination of Water and Waste Water (2005). American Public Health Association. Washington, DC, New York.
21. Soil Testing Methods (2020). Food and Agriculture Organization of the United Nations. Rome
22. [Onlinecourses.nptel.ac.in](https://www.nptel.ac.in)
23. <https://www.usgs.gov/educational-resources/online-lectures>

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Semester 3rd

Skill Enhancement Course

Subject: Environmental Science

Paper title: Agriculture and Entrepreneurship (Skill)

Code: BEV22S302

Credit: 04 (02 +02 Credits)

Contact Hours: 32 Th + 64 Pr

Course Objectives:

- The entire programme is aimed at making the students understand basic aspects and practices involved in Agriculture & Entrepreneurship from seed to seed i.e., production aspects, protection aspects, storage and marketing aspects of an agricultural product.
- The student shall be able to develop skills related to economic aspects such as cost of production, cost of selling, profit etc. .
- The student will also able to establish an entrepreneur on his own and help to generate employment to others.
- By learning extension methodology to transfer of technology, the student will acquire good communication skills and equip himself with personality development and become centre of attraction which helps him to become a successful entrepreneur.

Course Outcomes:

- Demonstrate effective knowledge about the evolution, importance, structure and dimensions of agri-entrepreneurship.
- Apply successful crop establishment methods for effective production.
- Evaluate the salient features of Agri Business management
- Execute human resource training and development – Participative management, Production management
- Demonstrate marketing management and developing marketing strategies.

UNIT-I: Agri-entrepreneurship

16 hours

1.1.Agriculture & Entrepreneurship – Importance and Scope

1.2. Branches of Agriculture & Entrepreneurship

1.3.Evolution of agricultural industry

1.4.Crop establishment methods

UNIT-II: Sustainability of Agri-entrepreneurship

16 hours

2.1.Production and protection aspects of crops

2.2.Extension methodology for technology transfer

2.3. Intellectual Property commercialisation in agriculture

2.4. Crop marketing

Unit III & IV: LABORATORY COURSE (2 CREDITS)

32 hours

1. Case studies based on Farmers market experience
2. Study of trends in food preferences in the college campus
3. Plant breeders experience in Intellectual property commercialization
4. Study of the farmer's market experience
5. Study of entrepreneurship opportunities in ethnic crops

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SEMESTER 1st to 3rd MULTIDISCIPLINARY
COURSE
ENVIRONMENTAL SCIENCE
W.e.f. Academic Session 2022

Title: Natural Resource Management

Code: BES22M103

Credit: 03 (T)
Contact Hours: 48 (T)

Theory (3 Credits)

Course Objectives: The student shall gain a broad and comprehensive understanding of the importance of natural resources and the causes of exploitation. It shall also help the student to develop proper management approaches for the Conservation of natural resources.

Learning Outcomes: After the completion of this course, the student shall be able to:

- *Define and distinguish between different types of natural resources*
- *Create a personal inventory of consumption of natural resources*
- *Explain the different dimensions of the natural resources*
- *Implement the management strategies in view of the exploitation of this resource as well as the future sustainability.*

UNIT-I: FUNDAMENTALS OF NATURAL RESOURCES

1. Introduction to Natural Resources
2. Concept of resource, classification of natural resources
3. Factors influencing resource availability, distribution and uses.
4. Interrelationships among different types of natural resources.
5. Ecological, social and economic dimension of resource management.

UNIT-II: Distribution and Exploitation of Natural Resources

1. Forest resources: Distribution, Use and over-exploitation
2. Land and Mineral Resources: resources: Land degradation and exploitation of minerals
3. Water resources: Use and over-utilization of surface and ground water
4. Energy resources: Growing energy needs, renewable and non-renewable energy sources
5. Food resources: world food security, changes caused by agriculture and over-grazing

UNIT-III: Management of Natural Resources

1. Resource Management Paradigms
2. Resource conflicts: Resource extraction, access and control system.
3. Approaches in Resource Management
4. Resource Management: Implications in developing countries
5. Management of Common International Resources

Books Recommended

1. Ecology of Natural Resources. Francois Ramade.1984. John Wiley & Sons Ltd.
2. Fundamentals of Ecology. Odum, E.P. 1971. W.B. Saunders Co. USA.
3. Global Change and Natural Resource Management, Vitousek, P.M. 1994. Beyond global warming: Ecology and global change. Ecology.
4. Environmental Biology, Agarwal, K.C., 2001. Nidhi Publication Ltd. Bikaner.
5. Global Biodiversity Assessment. Heywood, V.H. & Watson, R.T. 1995. Cambridge Univ. Press.
6. Environmental Science, Miller T.G. 1940; Jr. Wadsworth Publishing Co. (TB)
7. Essentials of Ecology, Townsend C., Harper J, and Michael Begon. 2008. Blackwell Science.

Government Degree College Baramulla
SEMESTER 1st to 3rd (Value Added Course)
ENVIRONMENTAL SCIENCE
W.e.f. Academic Session 2022

Course Title: Environmental Science Education (VAC)
Course Code: BES22V104

Credit value: 02 (Theory)
Contact Hours: 32 (T)

Theory: 02 Credits

Course objectives: The course intends to provide broad based knowledge on environment and makes students

1. *Understand the structure of our environment*
2. *Understand the concept of ecosystem and the general structure of ecosystems*
3. *Appreciate the services provided by different ecosystems and understand the dependence of humans on these services.*
4. *Understand biodiversity and its importance*
5. *Understand different forms of pollution and measures for their control*

Learning outcomes: The course will empower the students by:

1. *Gaining in-depth knowledge on environment and its various components.*
2. *Understanding of Ecosystem and its services*
3. *Predicting the consequences of human actions on the biodiversity*
4. *Developing critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity.*
5. *Capability to identify relevant environmental issues, analyse the various underlying causes, evaluate the practices and policies, and develop framework to make informed decisions*

Unit 1: Understanding Environment

16 Hours

- 1.1. Concept and importance of environment
- 1.2. Components of environment—physical, biological and social
- 1.3. Concept of ecosystem, trophic structure of an ecosystem
- 1.4 Ecosystem services—provisioning, regulating and cultural
- 1.5 Biodiversity—definition, values, threats and conservation

Unit 2: Natural Resources and Environmental Issues

16 Hours

- 2.1 Natural resources—classification and distribution
- 2.2 Natural resource management—basic principles
- 2.3 Air and water pollution—causes, consequences and control
- 2.4 Soil pollution, municipal solid waste management
- 2.5. Climate change—causes, consequences and management

Books Recommended

1. Environmental Science: A Global Concern: William P. Cunningham and Mary Ann Cunningham, 2009. Glencoe/McGraw-Hill School Pub.
2. Environmental Science: Earth as a Living Planet: Daniel B. Botkin and Edward A. Keller. 2005; John Wiley & Sons.
3. Environmental Science: Toward A Sustainable Future: Meg Keen, Valerie A. Brown, Rob Dybal. 2005 (1st edition). Routledge.

4. Ecology and Environment: P.D.Sharma. 2011. Rastogi Publications.
5. Text Book for Environmental Studies : Erach Bharucha. 2019. Universities Press (India) Private Limited
6. Perspectives in Environmental Studies: Kaushik & Kaushik. 2018. New Age International Publishers