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| Course title :**Environmental Education** | |  | |
| Course No. : Sc. Ed. 429 | | Pass marks : 28T + 8P | |
| Nature of the course : Theory & Practical  Level : B.Ed. (4 Year) | | Periods per week : 9 (6T + 3P) ,  Practical ( 3P) : 3pds/day/Week/gr. | |
| Year : Second | | Total Periods : 150  Time per period : 45 minutes | |
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**1. Course Description**

This course consists of theory and practical parts. The theory part includes Environment and Environmental education, Components of Natural Environment, Ecosystem and Biodiversity, Biogeochemical Cycles, Natural Resources, Natural disasters and their impacts in Nepal, Pollution, Sustainable Development, Urban Land Use and Their Management, Environmental Impact Assessment , Environmental Policy and Management

The practical part deals with the experiments on flora and fauna, soil, air, water and noise pollution, food chain, and climatic data. Students are required to secure pass marks separately in theoretical and practical examination.

**2. General Objectives**

The general objectives of the course are as follows:

* To acquaint the students with the general concepts and objectives of environmental education.
* To enable the students in elaborating the components of natural environment, types of ecosystem, biogeochemical cycles, natural resources and their conservation.
* To make the students familiar with the sources, effects and control measures of pollution.
* To make the students analyze the efforts of GO, NGOs and INGOs on environment monitoring and protection.
* To familiarize the students about environment protection laws.
* To make the students able to collect and classify the flora and fauna available in a region.
* To enable the students to conduct activities regarding the air, soil, water and noise pollution.
* To make the students able to conduct activities regarding ecosystem and climate

**3. Specific Objectives and Contents**

**Part- I Theory**

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| **Specific Objectives** | **Contents** |
| * Define and explain environment and environmental education. * Explain elements of Environment. * Elaborate the importance of environment * List the goals and objectives of environmental education (school level, university level and mass media). * Point out the importance of environmental education in school curriculum. * Discuss the qualities of secondary level environment curriculum. * Review and analyze the secondary level environment curriculum. | **Unit I :Environment and Environmental education (10)**   * Elements of environment. * Importance of environment * Environment and environmental education. * Goals of environmental education. * Objectives of environmental education. * Importance of environmental education in school curriculum. * Qualities of Environmental Education curriculum. * Review of environment curriculum. |
| * Explain different spheres of atmospheric structure. * Define and explain the hydrosphere. * Classify the habitats of water as lentic and lotic. * Define and explain the biosphere. * Describe the important elements of earth’s crust. * Explain the physical and chemical properties of soil. * Explain the process of soil formation. * Describe the micro and macro nutrients of soil. | **Unit II. Components of Natural Environment (9)**  **Introduction**   * Atmosphere * Hydrosphere * Biosphere * Lithosphere |
| * Explain ecosystem. * Describe the abiotic and biotic components of ecosystem. * Classify and explain types of ecological factors such as climate factors, topographic factors and biotic factors. * Define and explain food chain and food web. * Describe the roles of food chain and food web. * Draw the graphic representation of different types of ecological pyramids. * Explain terrestrial, grassland, forest, wetland, fresh water ecosystem. * Explain the limiting factors in the aquatic ecosystem. * Explain the process of succession. * Explain commensalism; amensalism and antibiosis. * Explain bio-diversity. * List and explain the types of biodiversity with examples. * Explain the importance of biodiversity. * Describe the degradation of biodiversity. * Discuss the need for conservation of biodiversity. * List and describe the national parks and wildlife reserves of Nepal * Discuss the roles of National parks and wildlife reserves for conservation of plants and animals * Explain the various causes of extinction of animals and plants. * Identify the endangered plants and animals of Nepal | **Unit III: Ecosystem and Biodiversity (25)**   1. **Ecosystem**  * Concept of ecosystem * Components of ecosystem * Ecological factors * Food chain * Food web * Ecological pyramids * Ecological factors * Types of ecosystem - Terrestrial and Aquatic * Succession * Commensalism, amensalism and Antibiosis  1. **Biodiversity**  * Concept of biodiversity * Types of biodiversity * Importance of biodiversity * Degradation of biodiversity * Conservation of biodiversity * National Parks and wildlife reserves of Nepal * Causes of extinction of animals and plants * Endangered plants and animals of Nepal |
| * Define biogeochemical cycle. * Classify different types of biogeochemical cycles. * Explain hydrological cycle. * Describe the gaseous cycles such as carbon cycle and nitrogen cycle. * Describe the sedimentary cycle such as Sulphur cycle. | * **Unit IV : Biogeochemical Cycles (8)** * Concept of biogeochemical cycles * Types of biogeochemical cycles * Hydrological cycle (Water cycle ) * Gaseous cycle (Nitrogen cycle, Carbon cycle ) * Sedimentary cycle (Sulphur cycle,) |
| * Define and explain natural resources. * Classify natural resources on the basis of perpetual, renewable and non-renewable resources. * Explain the water resources on the basis of surface, and ground water. * Describe the unused and protected land resources. * Explain the mineral resources of Nepal including coal, natural gas, costly metal and stones and mineral deposits of Nepal. * Discuss the types and status of the forest resources in Nepal. * Give the concept of community forestry and its importance in Nepal * List out important medicinal plants of Nepal. * Describe the concept, source and use of energy such as fuel, wood, fossil fuels, coal, petroleum, LPG and natural gas. * Explain the different forms of energy like hydropower, alternative sources of energy, solar energy, wind energy, wave energy, tidal energy, geothermal energy and nuclear energy. * Describe the importance of natural resources in Nepal. * Explain the status and the efforts in the conservation of different natural resources in Nepal. | **Unit V : Natural Resources (16)**   * Introduction of natural resources * Classification of natural resources * Water resources * Land resources * Mineral resources * Forest resources * Community forestry * Energy * Importance of natural resources * Conservation of natural resources |
| * Explain the nature, motion, intensity, magnitude and intensity scale of earthquake. * Describe the causes and impact of earthquake. * Explain the precautionary measures to minimize the loss from earthquake. * Describe the flood hazards on the basis of river channel, flood frequency and flood damage. * Discuss the causes and impact of drought and famine. * Describe the causes and impact of landslide. * Explain glacial hazards on the basis of flow regime, glacial landforms, glacial lakes and glacial lake outbursts floods. * Describe the cause and impact of wind storm. * Discuss the preventive and control measures of different hazards. | **Unit VI : Natural disasters and their impacts in Nepal (8)**   * Earthquakes * Flood * Drought * Landslide * Glacial hazards * Wind storm |
| * Explain environmental pollution and pollutants. * Classify different types of environmental pollution and pollutants. * Describe the sources, types and effects of air pollution on human beings, plants, animals and environment. * Describe the sources, causes, consequences and effects of greenhouse effect, acid rain and ozone layer depletion. * Explain the types, causes and their effects of water pollution on human beings, plants, animals and environment. * Define eutrophication and describe the causes, and consequences of eutrophication. * Describe the sources, causes and effects of land pollution on human beings, plants, animals and environment. * Define and explain the causes and effects of pesticides pollution. * Describe the sources, causes and effects of noise pollution on human beings and environment. * Explain the ways of control measures in air, water, land, noise and pesticide, nuclear pollution. * Explain the impact of man-made environmental degradation. * Justify the need and ways of developing awareness programs to reduce environmental pollution. * Discuss the pollution, monitoring and control techniques. | **Unit VII: Pollution (26)**   * Concept of pollution and pollutants * Types of pollutants * Air pollution   -Greenhouse effect, ozone layer depletion, acid rain   * Water pollution   -Eutrophication   * Land pollution * Noise pollution * Pesticide pollution * Nuclear pollution * Awareness program in improving environmental pollution * Pollution monitoring and control |
| * Explain the concept of sustainable development. * Point out the main principles of sustainable development. * To find the growth of economic activity and environment. * Explain the strategy for sustainable development. * Describe the social debate of environment and uses of technology for protection of environment. * Describe the need and importance of sustainable development. | **Unit VIII : Sustainable Development (8)**   * Concept of sustainable development. * Principles of sustainable development. * Economic activity and environment. * Strategy for sustainable development. * Environmental debate and appropriate technology. * Importance and need of sustainable development. |
| * Describe the process of urbanization and urban growth. * List the main resource of urban and describe the environmental problems with respect to urban resources. * Explain the process of urban land use, planning and control policy in Nepal. * Justify making urban areas more livable and sustainable on the basis of urban land use, planning and control. * Point out the major problems of urban land use in Nepal and ways to mitigate them | **Unit IX : Urban Land Use and Their Management (6)**   * Urbanization and urban growth * Urban resource and environmental problems * Urban land use, planning and control * Overview of major problems of urban land use in Nepal and ways to mitigate them   . |
| * Define and explain environmental impact assessment. * Describe the impact statement and prediction * Explain the environmental assessment process. * Prepare EIS. | **Unit X : Environmental Impact Assessment (EIA) (8)**   * Introduction * Impact statement and prediction * Environmental assessment process * Preparation of EIS (Environment Impact Statement) |
| * Describe the environmental policy of Nepal government. * Explain the national policies on environment and their implementation. * Explain the environmental protection laws of Nepal government and their implementation. * List out the objectives of environmental management. * Describe the components of environmental management. * Describe the needs and technique of solid waste management. * Explain the roles of environmental protection council : Ministry of forest and soil conservation, Ministry of environment science and technology in the conservation of environment. * Explain the efforts of NGOs and INGOs on environmental protection and conservation. * Describe the environment related institution and their role of conservation and protection of environment such as IUCN, UNEP, WWF, ICIMOD and NEFJ. * Point out the 21 agenda of Kyoto protocol Rio-declaration. | **Unit XI : Environmental Policy and Management (26)**   * Environmental policy of Nepal government * Environmental protection laws of Nepal government * Objectives of environmental management * Components of environmental management. * Needs of solid waste management for environment. * Technique of solid waste management. * Environmental protection and conservation efforts made by government agency of Nepal * NGOs and INGOs involved in environmental conservation activities. * Ministry of forest and soil conservation. * Ministry of environment science and technology * Environment related institution - IUCN, UNEP, WWF, ICIMOD, NEFJ * Kyoto protocol, Rio-declaration |

*Note: The number in the parenthesis indicate allocated teaching hours for each unit.*

**4. a. Instructional Techniques( Theory )**

The instructional techniques for this course are divided into two groups. First group consists of general instructional techniques application to most of the units. The second group consists of specific instructional techniques applicable to specific units.

**4.1. a. Instructional Techniques**

* Lecture method
* Discussion method
* Demonstration method
* Project method
* Problem solving method
* Collaborative method
* Case study method
* Seminar/Workshop method

**Theory part**

The annual examination of theoretical part will be held by the Office of the Controller of Examinations. The types and number of question to be included in the annual examination are given below.

|  |  |  |  |
| --- | --- | --- | --- |
| Types of questions | Total questions to be asked | Number of questions to be answered and marks allocated | Total marks |
| Group A: Multiple choice items | 14 questions | 14 × 1 mark | 14 |
| Group B: Short answer questions | 6 with 3 or questions | 6 × 7 marks | 42 |
| Group C: Long answer questions | 2 with 1 or question | 2 × 12 marks | 24 |

**Recommended Books and References**

**Recommended Books**

De, A.K. (2003). Environmental chemistry (5th ed.). India: New Age International Publishers. (unit 7)

Jadhav, H.V. and Purohit, S.H. (2008). *Global Pollution and Environmental Monitoring*. Himalaya Publishing House, Mumbai, India (unit 1 and 3 ).

Katyal, T. and Satake, M. (1998). *Environmental Pollution*. Anmol Publications Pvt. Ltd. New Delhi, India ( unit 1, 2, 3 and 4).

Miller, J.R. (2004). *Living in the Environment Principles, Connections and Solutions (Thirteen Ed.)*. Thomson Learning Academic Resources, USA ( unit 5,7, 8 ,10 and 11).

Pande, B.D. and et. al (Editors) (2000). *Environmental education source book for bachelor of education programme*. Kathmandu: IUCN Nepal ( unit 1 ,2,3,4,5,6, 7 and 11 ).

**Reference Books**

Asthna, D.K. & Asthana, M. (1998). *Environment problems and solutions*. New Delhi: S. Chand and Company, Pvt. Ltd. ( unit 6 and 8 ).

Jadhav, H.V. (1994). *Principles of environmental science*. New Delhi: Himalaya Publishing House Pvt. Ltd.( unit 9 and 10 ).

Pandit, C.N. **(2012)**.*Elementary Environmental Education.* Kathmandu: Bidur Prakashan.( unit 2,3,4,6,7,10 and 11).

Trivedi, R.N. (1995). *A textbook of environmental sciences.* New Delhi: Anmol Publication Pvt. Ltd.( unit 4 and 6 ).

**Specific Objectives and Contents**

**Part II: Practical**

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| **Specific Objectives** | **Contents** |
| * To collect, classify and preserve at least ten species of flora of a particular area. * To collect, classify and preserve at least ten species of fauna of a particular area. * To determine the density of different plant species in the grassland ecosystem by quadrat method. * To determine the frequency of different species in the grassland ecosystem by quadrat method. * To determine population density of butterfly by capture and recapture method. | **Unit I : Flora and Fauna**   * Flora * Fauna |
| * To find out the characteristic features such as color and texture of soil (at least three samples). * To find out the pH and moisture content of soil (at least three samples). * To find out the humus content of soil (at least three samples). * To find out the water holding capacity of soil sample (at least three samples).   .  . | **Unit II : Soil Pollution**   * Characteristic features of soil * Color and texture * pH and moisture * Humus content * Water holding capacity |
| * To measure the extent of dust falls out in a given area (at least three areas) * To study and find out the effects of air pollution in a given area (industrial). | **Unit III : Air Pollution**   * Dust Fall * Industrial pollution |
| * To analyze the color, temperature, turbidity of a polluted water sample. * To estimate qualitatively Cl-, SO4--, NH3 in a water sample. * To find out the pH and TDS in a polluted sample of water. * Determine the concentration of free chlorine in swimming pool water sample. * To observe eutrophic condition of water and prepare a report. | **Unit IV : Water Pollution**   * Qualitative analysis of water * pH and TDS * Concentration of Chlorine, Sulphate and Ammonia * Eutrophication |
| * To study and find out the effects of noise pollution in a given area and make a report. | **Unit V : Noise Pollution**   * Effect of noise pollution |
| * To study the food chain of any ecosystem * To study the Producers, Consumers, Decomposers of Forest/Grassland / Pond ecosystem | **Unit VI : Ecosystem**   * Forest Ecosystem * Grassland ecosystem * Pond Ecosystem |
| * To study and prepare the climatic data (temperature, rainfall, humidity) of different stations of Nepal. | **Unit VII : Climate**   * Temperature, rainfall and humidity |
| * To write a case study for any major disasters in Nepal | **Unit VIII: Natural disaster**   * Earthquake * Flood * Landslide |
| * To write a report on existing environmental education in science education courses of Nepalese basic/secondary school level * To study the solid waste management in the community and submit the report. * To study and find out the effects of solid wastes in a given area | **Unit IX: Field Report**   * Environmental education and   Curriculum   * Environmental management |

**4. b. Instructional Techniques( Practical)**

**4.1. b. General Instructional Techniques**

* Individual laboratory work.
* Group work
* Project work
* Case study

Note; The students will be given brief lecture on the theory and procedure of each experiment. Each student will perform the given experiments individually and has to maintain the record book with all the details of all the experiments after correction by the respective teachers.

**4.2.b. Specific Instructional Techniques.**

Each student has to submit two reports compulsorily for the given project works.

* One group report
* one report individually
  1. **Evaluation**

**Practical Part**

The marks allocated to practical part are given in the following table

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| --- | --- | --- | --- |
| Examination | Area of examination | Marks | Total |
| Internal | Regularity | 1 | 4 |
| Regular practical performance | 1 |
| Record book | 2 |
| External | Major Experiment | 4 | 16 |
| Minor Experiment | 2 |
| Two reports with presentation | 6 |
| Viva | 4 |

**Books for Practical**

.Jha. P.K et. al ( 1987). *A Practical Manual for Ecology*, Ratna Book Distributors, Kathmandu, Nepal

Maheswari, S.C. (1996). *Laboratory Manual in Biology,* Arya Book Depot, Karol Bagh New Delhi

Pandit C.N. and Subedi. Rishi (2070). *Environmental chemistry.* Kathmandu: Nepal Cambridge Publication Pvt.Ltd..

Sharma, P.D (2003). *Environmental Biology,* Rastogi Publication, Meerut, India