Syllabus
Department of Environment Science

Four Year B.Sc Honours Course
Effective from the Session : 2009–2010
National University  
Syllabus for Environmental Science B.Sc. Honours  
Sessions -2010-2011,2011-2012  
Year wise courses and marks distribution

### Second Year (Honours)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>4462</td>
<td>Environmental Chemistry</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>4463</td>
<td>Environmental Earth Sciences and Soil Sciences</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>4464</td>
<td>Environmental Biology</td>
<td>100</td>
<td>4</td>
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**Major theoretical Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>4465</td>
<td>Economics and Environmental Economics</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>4466</td>
<td>Information Technology</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>4467</td>
<td>Laboratory and Field work on Environmental Sciences</td>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>4496</td>
<td>Viva Voce</td>
<td>50</td>
<td>2</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>650</strong></td>
<td><strong>26</strong></td>
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**Related theoretical Courses**

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>9999</td>
<td>English</td>
<td>100</td>
<td>Non-Credit</td>
</tr>
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</table>
National University  
Subject: Environment Science  
Syllabus for Four Year B. Sc Honours Course  
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**Detailed Syllabus**

**Second Year (Honours)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Marks: 100</th>
<th>Credits: 4</th>
<th>Class Hours: 60</th>
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<tbody>
<tr>
<td>Course Title:</td>
<td>Environmental Chemistry</td>
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1. **Environmental Chemistry**: Definition, relationship with other chemical sciences, e.g., inorganic chemistry, organic chemistry, biochemistry, geochemistry and biogeochemistry

2. **Redox Processes in Aquatic Environment**: Significance, half-reaction, electron activity and pE, Nernst equation and its application, chemical equilibrium, pE and free energy, pE-pH diagram for iron and sulphur system, redox reaction and corrosion.

3. **Water Pollution**: Nature and types of water pollutants, elemental pollution and their determination, heavy metals, Cd, Hg, Cr etc., metalloids e.g. Arsenic in groundwater of Bangladesh, organic pollutants, pesticides in water, polychlorinated biphenyls.

4. **Water Treatment**: Treated water use, municipal water treatment, treatment of water for industrial use, removal of organic, removal of heavy metals and metalloids (arsenic), removal of phosphorus and nitrogen compounds.


7. **Air Pollution**: Atmospheric pollutants, Inorganic gasses, Organic and organic sulfites and particulate oxides of sulfur and sulfur cycle, Nitrogen Oxides and Nitrogen cycle, Urban air pollution, Mitigation of urban air pollution.


9. **Ocean pollution**: Sewage - source and effects of some marine pollution, toxic pollutants - antifouling paints, DDT, dioxins, PCBs; oil on water, marine debris - fishing gears, plastics.

**Recommended References:**

2. Environmental Chemistry of Soil, M. McBride.
Section A
1. Philosophy and Fundamental Principles of Environmental Earth Sciences: Cultural basis for Environmental awareness; Fundamental Concepts of Environmental Geology; Earth materials and processes;
2. Hazardous Earth Processes: An overview on Natural Hazards; Disaster Prediction and Risk Assessment; Human Response to Hazards.
4. Volcanic Activities: Effects and prediction of volcanic activities; Adjustment to and perception of volcanic hazards.
5. The Geologic Aspects of Environmental Health: Health factors; Some Geologic factors of Environmental Health; Trace Elements and Health; Chronic Disease and Geologic Environment; Other Geological Hazards- Asbestos, Radon.
6. The Environmental Effects of Mining: Definition: Mining, Ore, protore, Metals and Metalloids and their effect; The Source of Acid Mine Drainage; Pit Lakes, Approaches to Treating Pit Lake Pollution; Mining Effects (Primary Effects, Secondary Effects Tertiary Effects); Environmental Effects of Mining; Pre-Mining vs. Post-Mining Contamination.

Section B
1. Definition of soil, volume composition of soil: Soil as a component of ecosystem; Minerals of soils, Importance of soil.
2. Soil formation, Soil profile and texture: Weathering of rocks and minerals, different types of weathering, factors influencing weathering, Processes of soil formation; master horizons, Soil particles-classification; textural classes and their significance.
3. Soil structure and Morphology: Mechanism of aggregate formation and dispersion; classification on the basis of shape; importance of soil structure in relation of air-water content; Soil densities and pore space.
4. Soil water: physical classification; forces of retention; soil water constants. Factors contributing the availability water to plants; Effect of excess water on soil processes; Infiltration, runoff and permeability-their consequences on soil and environment.
5. Soil as a source and sink of pollutants, Soil as a medium for plant growth-essential elements, their available forms; sources.

Recommended References:
1. **Structures and functions of life**: mitochondria and the process of cell respiration; Chloroplast and the process of photosynthesis, Significance of photosynthesis; structures of DNA and RNA, protein synthesis; chromosomes and cell division; heredity.

2. **Genetic engineering and recombinant DNA technology**: tools and methods of recombinant DNA technology; enzymes involved in recombinant DNA technology; Improvement of useful microorganisms – mutations and selection of strains, protoplast fusion technology; uses of recombinant DNA technology.

3. Biological communities and ecosystems; characteristics of biological populations; Interactions between diverse populations-neutralism, commensalism, synergism, mutualism, competition, amensalism (anatagonism), parasitism and predation; human population dynamics, study of populations; presentation of demographic data; community concept; structure of communities; global distribution of terrestrial communities; patterns of diversity and global diversity; concept of ecosystem, trophic levels and productivity; ecosystem stability.

4. Succession and biomes; vegetation changes; patterns of succession; human influence on succession; world's terrestrial biomes; wetland and freshwater biomes; coastal and marine biomes.

5. Ecological genetics; sources of variation; patterns of variation, reproductive system-obligate cross-fertilisation, facultative cross-fertilisation, self-fertilisation, seed apomixis; vegetative reproduction; genetic consequences of different reproductive systems.

6. Behavioural ecology and sociology; optimisation theory; growth versus reproduction; parental care; r and k species; breeding systems in plants: alternative strategies; games theory; living in groups, their advantages and disadvantages; the unit of selection and social behaviour; human socio-biology.

7. **Plant-animal interrelationships**: pair wise co-evolution; diffuse co-evolution; angiosperm-pollinator relationships; introduced/ exotic species.

8. **Adaptation of Organism**: Adaptation of plant – Introduction and classification of plants on the basis of adaptation, Morphological, anatomical and physiological adaptive characteristics of hydrophytes, xerophytes and halophytes; Adaptation of animal- natural selection and behaviour, visual adaptation to unfavourable environment.

**Recommended References:**


5. Population Dynamics: Fertility: Measures and Determinants, an Economic Model of Family Size, Fertility Trend in Bangladesh, Mortality Measures, Determinants and consequences,


Recommended References:
Course Code 4466 | Marks: 100 | Credits: 4 | Class Hours: 60

Course Title: Information Technology

1. **Introduction to Computers**: Basic Organization; Types of Computers; Importance, Scope and Limitations of Computer uses; History and Generations;
2. **Number Systems, Codes**: Number Systems; Conversion of Numbers; Binary Arithmetic; Data Representation and Codes;
3. **Digital Circuits and Microcomputers System Unit**: Logic Functions and logic gates; Logic simplifications; Combinational circuits; Basic Organization; Motherboard and Adapters; Bus organized Architectures; Working Principle of a Microcomputer;
4. **Microprocessors and Input and Output Devices**: Basics of Microprocessors; Inside the Microprocessors; Microprocessors: Past, Present & Future; Parallel Processing; Input/Output Operations Media; Input Devices; Output Devices; Other Peripheral Devices;
5. **Memory Organizations and Database**: Memory Basics; Main Memory; Secondary Memory; Special Memory; Database concepts; Database structures and access;
6. **Computer Software, Software development process and Computer Networking**: Introduction and Classification; System Software; Operating System; Package Programs; High Level Languages; Program development life cycle; Software development life cycle; Network Basics; Internet & Internet services;
7. **Emerging Information Technology**: IT Concepts and Applications; Multimedia Systems; Electronic Commerce; Other emerging technologies;
8. **Computers and Society**: Social Impact; Computer Security; general Maintenance; troubleshooting; Selection of Microcomputers.

**Recommended References**:
2. James O'Brien: Management Information Systems
4. Mustafa Jabber, Computer and Information Technology
Chemistry
1. Preparation and standardization of acid and base solution.
2. Determination of major physical and chemical properties of water and wastewater (pH, EC, turbidity, TDS, TSS, total solids, total hardness, total alkalinity, total acidity, DO, BOD, COD).
3. Determination of the concentration of major metal ions in water and wastewater (Fe, Cu, Pb, Cr, Ni, Ca, Al).
4. Complexometric titration with EDTA as primary standard substance (using Murexide and Solochrome Black/Eriochrome Black T indicator).
5. Gravimetric analysis of some major anions (chloride, carbonate, sulphate, phosphate).

Earth and Soil Sciences
1. Several field tour in the environmentally important areas.
   a. Description of minerals and rocks in outcrop.
   b. Investigate soil condition of the area.
   c. Collect soil and rock samples.
   d. Analysis of the samples in the laboratory and
   e. Submission of field tour report.
2. Determination of Soil texture by Particle-size analysis-hydrometer method
3. Determination of Soil density by Bulk and Particle density measurement.
4. Study and Identification of common Igneous, Sedimentary and Metamorphic rocks in thin section.

Biology
1. Field survey on Environmental Biology.
2. Collection Technique of phytoplankton and zooplankton.
3. Identification and characterization of 15 Phytoplankton and 10 Zooplankton.
4. Study of the adaptive characteristics (anatomical modifications) of hydrophytes, xerophytes, mesophytes and halophytes.
5. Study of the reproductive behavior of suitable plant and animal species.
7. Study of ecosystem composition in J.U. Campus and surrounding areas.

Viva-voce on courses studied in the first and second years.
Aims and objectives of this course: To develop students’ English language skills, to enable them to benefit personally and professionally. The four skills — listening, speaking, reading and writing will be integrated to encourage better language use.

1. **Reading and understanding**

   Students will be expected to read passages that they might come across in their everyday life, such as newspapers, magazines, general books etc. Simple stories will also be included to give students a familiarity with different uses of the language.

   *N.B.: 5 Questions are to be answered. Each question will carry 4 marks. There may be division in each question*

   a) Understanding different purposes and types of readings
   b) Guessing word-meaning in context.
   c) Understanding long sentences
   d) Recognizing main ideas and supporting ideas.
   e) Answering comprehension questions.
   f) Writing summaries.

2. **Writing**

   a) Writing correct sentences, completing sentences and combining sentences.

   b) Situational writing: Posters, notices, slogans, memos, advertisements etc.

   c) Paragraph writing: Structure of a paragraph; topic sentences; developing ideas; writing a conclusion; types of paragraphs (narrative, descriptive, expository, persuasive); techniques of paragraph development (such as listing, cause and effect, comparison and contrast).

   Or,

   d) Newspaper writing: Reports, press releases dialogues etc.

   e) Writing resumés. Or,

   f) Writing letters: Formal and informal letters, letters to the editor, request letters, job applications, complaint letters etc.

   g) Essay: Generating ideas; outlining; writing a thesis sentence; writing the essay: writing introductions, developing ideas, writing conclusions; revising and editing.

3. **Grammar**

   a) Word order of sentences.

   b) Framing questions.

   c) Tenses, articles, subject-verb agreement, noun-pronoun agreement, verbs, phrasal verbs, conditionals, prepositions and prepositional phrases, infinitives, participles, gerunds. (Knowledge of grammar will be tested through contextualised passages).

   d) Punctuation.

4. **Developing vocabulary** : Using the dictionary, suffixes, prefixes, synonyms, antonyms, changing word forms (from verb to noun etc.) and using them in sentences.

5. **Translation from Bengali to English.**

6. **Speaking skills** : Speaking skills should be integrated with writing and reading in classroom activities.

   The English sound system; pronunciation skills; the IPA system; problem sounds, vowels, consonants and diphthongs; lexical and syntactic stress.

   (Writing dialogue and practising it orally students can develop their speaking skill. Dialogue writing can be an item in writing test.)