Elective Courses

Semester II

(Environmental Science)

St Xavier's College (Autonomous),

Ahmedabad 380 009

Elective Courses

Semester IV

St Xavier's College (Autonomous),

Ahmedabad 380 009

Course content

Elective Paper: Study of Biodiversity in Captivity and in Nature
Course Code: EG 4301
No. of Credits: 02
Learning Hours: 30 hrs

UNIT – 1

Classification of Invertebrates – Arthropoda to Hemichordata, giving suitable examples.

UNIT – 2

Visit to the Kamala Zoological Park to study the various wild animals in captivity.

UNIT – 3

FLORAL DIVERSITY : Study of plants in natural environment & in garden settings.

UNIT – 4

Conservation Issues : *ex situ* & *in situ* measures; environmental activism. Visit to SERENITY Conservation Centre.

***Reference Books* :**

1. Textbook of Invertebrates, R. L. Kotpal
2. Manual of Zoology, E.K. Ayyer
3. Textbook of Zoology, R. D. Vidyarthi
4. An Introduction to Biodiversity, B.R. Goel
5. Biodiversity, Supriyo Chakraborty
6. Biodiversity, Assessment and Conservation, Ed. By Pravin Chandra Trivedi, Agrobios.

CORE Paper: Soil Composition and Analysis (Theory)
Course Code: EG 4302
No. of Credits: 02
Learning Hours: 30 hrs

I. Course Overview & Course Objectives

The main objective of the course will be to build the basic foundation for studying chemistry. By the end of the paper, a student should be able to:

(a) To learn fundamentals of Soil Chemistry.

(b) To learn analysis of primary nutrients of soil

(c) To learn analysis of secondary nutrients of soil

(d) To learn analysis of micro nutrients of soil.

Thus, the knowledge from the course can help in the following:
(a) Basic knowledge of Soil chemistry is important for theoretical and practical applications
(b) The students could pursue a career in applied chemistry and also in the field of research in soil
chemistry.

II. Course Content

Unit 1 Introduction to Soil Chemistry (8L) [14 Marks]
[Prerequisites or topics for Self Study: - Basic terms related to Soil Chemistry]

Importance of soil, soil formation, composition of soil, the soil profile, types of soil, micro and macro plant nutrients.

Unit 2 Analysis of Primary Soil Nutrients (7L) [14 Marks]
[Prerequisites or topics for Self Study: - Basic terms related to Analysis of Primary Soil Nutrients]

Soil fertility and productivity, techniques for the analysis of soil, soil reaction, determination of total nitrogen in soil, determination of phosphorus in soil, determination of potassium in soil by flame photometry.

Unit 3 Analysis of Secondary Soil Nutrients (8L) [14 Marks]
[Prerequisites or topics for Self Study: - Basic terms related to Analysis of Secondary Soil Nutrients]

Determination of total sulphur in soil, determination of calcium in soil determination of magnesium in soil, determination of lime and liming material in soil. Mechanical analysis of soil.

Unit 4 Analysis of Micro Soil Nutrients (7L) [14 Marks]

[Prerequisites or topics for Self Study: - Basic terms related to Analysis of Micro Soil Nutrients]

Determination of total manganese in soil, determination of Fe (II) and Fe (III) in soil, determination of silica in soil, determination of soluble salts in soil, determination of sodium in soil by flame photometry.

III. Teaching methodologies: Apart from the conventional black board teaching, other modes of teaching that will be adopted are power points, problem solving, and group discussion. Assignments will be designed such that students inculcate the habit of reading reference books and science journals. The use of smart boards for teaching will also be promoted to enable more interaction based teaching.

Elective Paper: Introduction to Nanotechnology
Course Code: EG 4303
No. of Credits: 02
Learning Hours: 30 hrs

PHY – SY, New Elective: Introduction to Nanotechnology (EG-4302) (2 Credit : 3 hrs/week)

Unit – I: Introduction to Nanomaterials: Introduction to nano-sized materials and structures, Definitions of nanomaterials, Brief history of Nanomaterials and challenges in Nanotechnology, Properties of Nanomaterials: Effect of reduction of dimensions, quantum size effects, Mechanical, Thermal, Optical and Magnetic properties of nanomaterials.

Unit – II: Methods of Synthesis of Nanomaterials: Bottom-up and Top-down approaches - Mechanical method: High Energy Ball Milling, Methods based on evaporation (Physical Vapour Deposition), Chemical Vapour Deposition, Chemical Methods: Colloidal and Sol-gel Methods.

Unit – III: Methods of Special Nanomaterials: Carbon Nanotubes (CNT), Types –Single walled, multiwalled CNT, Structures and properties of CNTs, Synthesis of carbon nanotubes, Graphene and other Carbons allotropes.

Unit – IV: Analytical (Characterization) Techniques: Microscopes: Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), X-ray diffraction (XRD), Vibrational Spectroscopy, Applications: Electronics, Biotechnology and Medical, Automobiles, Space, Defense, Sports, Cosmetics, Cloth Industry.

Text Books: Nanotechnology: Principles and Practices by Sulbha K Kulkarni, Capital Publishing Co. New Delhi.

References :

1. Introduction to Nanotechnology, C.P. Poole Jr. and F.J. Ownes, Wiley Publication.
2. Nanoscience and Technology eds. R.W.Kelsall, I.W. Hemley & M. Geoghehan, John Wiley and sons.
3. Introduction to Nanoscience and nanotechnology by K.K. Chattopadhyay and A.N. Banerjee, PHI Learning Pvt. Ltd. 2012.
4. Origin and Development of Nanotechnology, P.K.Sharma, Vista International Publishing House.

Elective Paper: Public Health
Course Code: EG 4304
No. of Credits: 02
Learning Hours: 30 hrs

Unit 1
Introduction to Public Health
Functional Laws

Unit 2
Air
Water
Food
Solid waste, biomedical waste
Entomology and vector-borne diseases
Population

Unit 3
Analytical methods of Public Health
Indicators in Public Health

Unit 4 Public Health & Medical Care
TB
Other communicable diseases,
Government & important public Health programs
Vaccination
Sterilization
Family Planning
HIV/AIDS
Child obesity
Malnutrition
Smoking and other tobacco related issues

Discussion, ideation, project selection
Presentation

Elective Paper: Latex for Maths and Science

Course Code: EG 4305
No. of Credits: 02
Learning Hours: 30 hrs

Elective Paper: Economic Statistics-II

Course Code: EG 4306
No. of Credits: 02
Learning Hours: 30 hrs

Unit 1: Time Series-1

- Meaning of Time series
- Various components of time series: Trend, Seasonal, Cyclic and Random components.

Unit 2: Time Series-2

- Methods of measuring Trend by
  a) Graphical method
  b) Moving average methods
  c) Least squares method.

- Measurement of Seasonal indices by
  a) Ratio to trend
  b) Ratio to moving average method.

Unit 3: Index Number-1

- Introduction
- Basic problems in the construction of index number
- Limitations and uses of Index numbers.

Unit 4: Index Number-2

- Construction of index number using in un-weighted and weighted aggregate methods
- Tests of index number.

References:

1. Gupta, S.C., and Kapoor, V.K.: Fundamentals of Applied Statistics, Sultan Chand Publications**.**
2. Goon, A.M., Gupta, M.K. and Das Gupta, B. (1991): Fundamentals of Statistics Vol. II, World Press, Calcutta.
3. MukhoPadhyay, P.: Applied Statistics, New Central Book Agency (1999).

Reference Website:

1. www.sxca.edu.in
2. www.statsci.org/datasets.html (Data sets)

3. www.math.uah.edu/stat (Virtual laboratories in Statistics)
4. www.stat.ucla.edu/cases (Case studies in Statistics)
5. www.bmj.bmjournals.com (Excel data and Statistical Analysis)
6. www.psychstat.missouristate.edu (Introductory Statistics & Multivariate Statistics: Concepts,
   Models and Applications)
7. www.statpages.org (Web Pages that perform Statistical calculations)
8. www.amstat.org/publications/jse/jse-data-archive.html (Research Journals, magazines)
9. www.amstat.org/publications/chance (Chance magazine)
10. www.amstat.org/publications/stats (STATS: the magazine for students of Statistics)
11. www.freestatistics.org (for online software and search)