

# Elective Courses

## Semester I

St Xavier's College (Autonomous),

Ahmedabad 380 009

## **Course content**

EG-1301: Separation methods in Chemistry

EG-1302: Introduction to Digital Electronics

EG-1303: Nutrition and Dietetics

EG-1304: Descriptive Statistics

EG-1305: Science and Society

EG-1306: Computer Basics

EG-1307: Biodiversity

EG-1308: Matrix Algebra thorough SCILAB

## **Elective Paper: Separation Methods in Chemistry (Theory)**

**Course Code: EG 1301**

**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 various types of Distillation methods for Physical separation of chemicals.
- (b) To learn principle of Solvent Extraction method.
- (c) To learn basics of chromatography and types of chromatography.
- (d) To learn about TLC, ion Exchange Chromatography and their applications.

Thus, the knowledge from the course can help in the following:

- (a) Basic knowledge of separation methods in chemistry which is important for practical and industrial applications
- (b) The students could pursue a career in chemistry, Industrial chemistry and Post-graduation and also in the field of research in Chemistry.

### **II. Course Content**

#### **Unit-1 Physical Methods of separation (Distillation)**

**[8L]**

*[Prerequisites or topics for Self Study: Basic terms related to physical separation of chemicals and distillation]*

Distillation and types of distillations, (1). Simple Distillation (2). Fractional Distillation  
(3). Steam Distillation

#### **Unit-2 Introduction to Solvent Extraction**

**[7L]**

*[Prerequisites or topics for Self Study: Basic terms related to extraction, types of extraction.]*

Principle of solvent extraction, Partition Ratio, Distributer Coefficient, Illustrations of Solvent Extraction.

#### **Unit-3 Introduction to chromatography**

**[7L]**

*[Prerequisites or topics for Self Study: Basic terms related to Chromatographic Techniques]*

Classification of Chromatographic Techniques, (based on mobile phase and type of equilibria)

Basic Principles of Elution Chromatographic terms like eluent, eluate, partition ratio, retention time etc.

#### **Unit-4 Specific Chromatographic techniques [8L]**

*[Prerequisites or topics for Self Study: Basic terms related to TLC, Ion exchange chromatography techniques]*

- (1) Paper Chromatography: Nature of Stationary Phase, Development of Chromatograph.
- (2) TLC: Nature of separation, technique of TLC, Process of development of plate, quantitative determination.
- (3) Introduction to ion Exchange Chromatography: Principle, Classification of Ion exchange resins, Properties of ion exchange resins, Factors affecting ion exchange separations, Applications of Ion exchange resins.

**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.

#### **IV. Reference books: EG 1301: Separation methods in chemistry (Theory)**

- (1) Separation Science by Khopker
- (2) Separation methods by H Kaur
- (3) Instrumental methods of chemical analysis by Chatwal and Anand.

#### **Elective Paper: Introduction to Digital Electronics**

**Course Code: EG 1302**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

#### Unit: 1

- Digital Principles
- Definition for digital signals
- The basics gates – NOT, OR, AND
- Universal logic gates – NOR, NAND
- AND-OR Inverter gates
- Positive and Negative logic

#### Unit: 2

- Boolean laws and theorems
- Sum of products method
- Binary number system
- Binary to Decimal conversion
- Decimal to Binary Conversion
- Binary addition
- Binary Subtraction

#### Unit:3

- Multiplexer
- Demultiplexer
- 1 of 16 Decoder
- BCD to Decimal Decoder
- Seven Segment Display
- Encoders
- RS Flipflop
- Gated Flipflop
- Edge triggered RS flipflop
- Edge triggered D flipflop
- Edge triggered JK flipflop

### **Elective Paper: Nutrition and Dietetics**

**Course Code: EG 1303**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

#### **UNIT 1: General Nutrition - I**

- Introduction and definition of food and nutrition
- Classification of food and basic food groups

- Carbohydrates and fibers
- Proteins
- Recommended Dietary Allowance

## **UNIT 2: General Nutrition – II**

- Fats and Lipids
- Vitamins and Minerals
- Assessment of Nutritional status through anthropometric and biochemical tests
- Protein Energy Malnutrition

## **UNIT 3: Dietetics**

- Diet during pregnancy
- Diet during infancy
- Diet during childhood
- Diet during adolescence
- Diet during adults
- Diet during old age

## **UNIT 4: Food adulteration**

- Definition of food adulteration
- Types of food adulteration
- Adulterated food items and their detection
- Consequences of food adulteration
- Food adulteration Act and its enforcement
- Safety Standards

## **Elective Paper: Descriptive Statistics**

**Course Code: EG 1304**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

### **Unit:1 Types of data, Classification and Graphs & Diagrams**

- Types of data – Primary and secondary data, qualitative and quantitative, nominal, ordinal, interval and ratio scale data
- Classification of data
- Representation of statistical data by  
(1) Histogram (2) Frequency Polygon (3) Frequency Curve and Cumulative Frequency Curves of less than and more than type (Ogive curves)
- To obtain median, mode, quartiles, deciles, percentiles, from the above graphs and simple examples.

### **Unit:2Measures of Central Tendency**

- Meaning of central tendency.
- Various measures of central tendency: arithmetic mean ,median, mode, their merits and demerits.
- Simple examples of Mean, Median and Mode.
- Positional Measures of central tendency: Quartiles, deciles, percentiles. their merits and demerits, Simple examples

### **Unit:3Measures of Dispersion**

- Definition of dispersion.
- Measures of dispersion.
- Simple examples to find various measures of dispersion by different methods (Range, Q.D., M.D., S.D) for grouped and ungrouped data.

### **Unit:4Skewness and Kurtosis**

- Meaning of Skewness.
- Tests of skewness, Measures of Skewness.
- Karl Pearson's and Bowley's method to measure the skewness.
- Meaning of kurtosis, Measures

### **References**

1. S.C. Gupta and V.K. Kapoor (2010) Fundamentals of Mathematical Statistics ,, S. Chand Publications (15th Edition)
2. Agarwal, B. S. (1996) : Basic Statistics ( 3<sup>rd</sup> Ed.) Newage International Publishers.
3. Goon, A.M. Gupta; M.K. and DasGupt. B. : Fundamentals of Statistics, Vol. – 1 (1991)

### **Elective Paper: Science and Society**

**Course Code: EG 1305**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

#### **Unit 1: The Science-society interaction: an overview.**

- (a) Science has rendered invaluable service to mankind.
- (b) Science has created problems for mankind.

#### **Unit 2: What is science?**

- (a) Misconceptions about science: Misinterpretations of the scientific process; Misunderstandings of the limits of science; Misleading stereotypes of scientists .

- (b) Scientific vocabulary: Fact, Law, Observation, Hypothesis, Theory, Falsifiable, Uncertainty, Error, Prediction, Belief.

### **Unit 3: The social side of science: A human and community endeavour**

- (a) The scientific community: Diversity makes the difference
- (b) Science: A community enterprise
- (c) Scientific scrutiny
- (d) Society supports science. Science meets society's needs. Shaping scientists.

### **Unit 4: Science & Technology**

- (a) Science fuels advances in Technology.
- (b) Science and our personal lives.
- (c) A scientific approach to life.

### **REFERENCES**

Biswas, Arun Kumar (Edited), 2001, *History, Science and Society in the Indian Context : A Collection of Papers*, The Asiatic Society, xv, 474 p, ISBN : 8172361033.

Russell, B., (1985), *The Impact of Science on Society*, Psychology Press.

Singh, S., K. C. Garg, S. Pruthi, B. Dutt (2001) *Indicators of Indian Science and Technology*, (NISTADS), Allied Publishers.

Stanford Encyclopedia of Philosophy: Helen Longino's "*The Social Dimensions of Scientific Knowledge*" (HTML) [www.http://plato.stanford.edu/entries/scientific-knowledge-social/](http://plato.stanford.edu/entries/scientific-knowledge-social/)

University of California, Berkeley: (HTML)

[http://undsci.berkeley.edu/article//scienceandsociety\\_01](http://undsci.berkeley.edu/article//scienceandsociety_01)

### **Elective Paper: Computer Basics**

**Course Code: EG 1306**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

*ELECTIVE COMPUTER F.Y. B.Sc.SEM. -I*

**Course Name: Computer Basics, Internet & Web page development (Theory)**

**Course Code: EC-101**

#### **Objectives:**

The purpose of this course is to present the overview of the fundamentals of computer,



Internet and resources used for it, web page designing and process & storage of data in computer system. Students will be able to understand the basic activities related to Internet and basic knowledge for design of a web page / web site.

**Prerequisites:** None

**Contents:**

### **1. Computer Fundamentals**

History, Characteristics and Generation of Computers, Classification of Hardware and Software, Basic knowledge about CPU, Control Unit, ALU (Concepts only), Memory: Primary memory, secondary memory, Storage devices (HDD, CD-ROM, DVD), I/O Devices: (key board, mouse, scanner, Plotter, OCR, OMR, CD-Drive), Display Devices (VDU, LCD, Touch screen, TFT), Types of printers: (Impact and non-Impact).

### **2. Internet Concepts & Application**

Introduction to Internet & WWW, History of Internet services, Intranet, Extranet, Types of Computer network, Network topology, Network components, URL, Search engine, News group, E-mail – concepts, protocols & netiquettes, Web portal, Forms of chats & conferencing, Remote login, IP address & DNS, FTP, Introduction to e-commerce, e-learning, e-banking, e-governance and social networking.

### **3. Introduction to HTML**

Introduction of HTML & SGML, Skeleton of HTML, Tools required for HTML, HTML tags & attributes – Basics, Formatting, List & Hyperlinks, Images and Image map in HTML.

### **4. Web Page Development Using HTML**

Tables, Frames and floating frames, Forms, Audio & Video in HTML, Introduction of Dynamic HTML, Difference between HTML and DHTML, Introduction to CSS, Types of Style Sheets, Use of CSS in Web Site Development, Implementation of font, color, border and text attributes in CSS, Introduction of FrontPage, Web page / Web site development using FrontPage.

**Reference Book(s):**

- 1) **Computer Fundamentals**, by V. Rajaraman, Prentice – Hall of India.
- 2) **Inside IBM PC**, by Peter Norton, Prentice – Hall of India.
- 3) **HTML in 21 days**, SAMS publication.
- 4) **How to create Web Pages using HTML**, by K Laudon, Tata McGraw Hill
- 5) **Web Enabled Commercial Application Development using HTML, DHTML**, Ivan Bayross , BPB Publisher.
- 6) **Introduction to Internet**, by Hantani, Tata McGraw Hill .
- 7) **The Internet**, by Douglas E Comer, Prentice - Hall of India.
- 8) **Fundamentals of Internet and www**, by Greenlaw R and Hepp E , Tata McGraw Hill.
- 9) **The Complete Reference HTML**, by Thomas A Powell, Tata McGraw Hill.
- 10) **Internet and Web Design**, Doeacc “O” Level, Firewall Media.
- 11) **Mastering Microsoft Frontpage-2000**, by Daniel A. Tauber, Brenda Kienal & Molly E. Holzschlag, BPB Publication.
- 12) **Internet Technology and Web Design**, ISRD Group, Tata McGraw Hill
- 13) **World Wide Web design with HTML**, by C Xavier, Tata McGraw Hill

**Accomplishments of the student after completing the course:**

At the end of the work student will be able to

- Use internet for information retrieval & data transfer.
- Design web pages / web sites using HTML.

**Course Name: Computer Basics ,Internet & Web page Development  
(Practical)**

**Course Code: EC-101**

**Objectives:**

The purpose of this course is to present the overview of the fundamentals of computer, Internet and resources used for it, web page designing and process & storage of data in computer system. Students will be able to understand the basic activities related to Internet and basic knowledge for design of a web page / web site.

**Prerequisites:** None

**PRACTICAL – HTML EXERCISE**

1) Write the HTML code at least with 30 lines which make use of following tags:

*The Italics tag, center tag, paragraph tag, Break tag, font tag and its attributes.*

2) Create the HTML file name Assignment.htm with the given text and below specification:

3) **Welcome to ABC Institution**

ABC was founded in 1988 to offer distance learning programs. The privately owned independent college once named, "American Institute for Computer Sciences," changed its name to better reflect what students can accomplish with distance education.

A typical student at ABC is 26 to 40 years old and many of them work in a tech-related field. All of them want to better themselves by getting the college degree they need to progress up the career ladder.

a) Specify the title/Header '**Welcome to ABC Institute**' at the top of file.

b) Centre the above title and change font size to ARIAL, 14.

c) Give three lines spacing after the title.

d) Apply BOLD, UNDERLINE and ITALIC effect to it.

e) Select appropriate BACKGROUND and BGCOLOR attributes.

f) Use text formatting command using paragraph break and line breaks.

g) Emphasize document context using Align, Size and Width tags.

4) Looking at the screen given below write the HTML code making use of following tags.

Text Content

**Example on Unordered list**

- Sports Car
- Business Car
- Economy Car

**Example on Ordered list**

Sports Car  
Business Car  
Economy Car

*ELECTIVE COMPUTER F.Y. B.Sc.SEM. -I*

**Example on Definition list**

- Sports Car
  - Ferrari
- Business Car
  - Tata Sumo
- Economy Car
  - Maruti

5) Design a web page using the image files 'XYZ.GIF', 'PQR.GIF' and 'DEF.GIF' according to the following specifications. (Use an appropriate Text content)

- ◆ Use a Border for 'XYZ.GIF'.
- ◆ Resize the width and Height 'PQR.GIF' and 'DEF.GIF' to 100 pixels each.
- ◆ Align the text with respect to the images so as to obtain the desired output.

6) Create a web page giving the following Flight details in a tabular format.

- ◆ Flight Name
- ◆ Starting Place
- ◆ Destination Place
- ◆ Arrival and departure time
- ◆ Class
- ◆ Fare

a) Place a border for the table and use all padding to present the cell data with clarity.

b) Align the table in the center of the screen. Use a caption saying 'Schedule for flights'.

c) Change font style, color, and size of title 'Schedule for flights' to ARIAL '15 & line spacing 2.5 to the table data.

d) Use the appropriate background color for data of table.

e) Save the file with 'FLIGHT.HTM'

7. Create a specimen of a corporate web page. Divide the browser screen into two frames.

The frame on the left will be a menu consisting of hyper links. Clicking on any one of these links will lead to a new page, which must open in the target frame, which is on the right hand side.

8 Create two links the first link that will open a page that displays the company profile, its business and its products. The second link will display the contact address of the company.

**Elective Paper: Biodiversity**

**Course Code: EG 1307**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

**Elective Paper: Matrix Algebra through SCILAB**

**Course Code: EG 1308**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

**Unit-I**

Introduction to Scilab.

**Unit-II**

Some elementary problems of matrix algebra using Scilab.

**Unit-III**

Some advanced problems of matrix algebra using Scilab.

**Unit-IV**

Practical Based on the Unit-I, Unit-II, Unit-III

List:

- 1 To input row vectors, column vectors, square and rectangular matrices.
- 2 To obtain addition, subtraction and multiplication, division of matrices and multiplication of matrix with scalar.
- 3 To obtain sub matrices of given matrix and to delete rows and columns.
- 4 To find minors, cofactors and adjoint of a matrix.
- 5 To find inverse of the matrix using adjoint of a matrix.
- 6 To learn commands zeros, ones, eye, rand, det(), inv(), command for transpose.
- 7 To find the inverse of a matrix using GAUSS-ELIMINATION method..
- 8 To find inverse of given matrix using GAUSS-JORDAN method
- 9 To find Eigen values and Eigen vectors of given matrix
- 10 To find inverse of given matrix using CAYLEY-HAMILTON theorem

Reference Books:

- An Introduction to Scilab by Satish Annigeri

# Elective Courses

## Semester III

St Xavier's College (Autonomous),

Ahmedabad 380 009

## **Course content**

EG-3301: Green Chemistry

EG-3302: Electronic Appliances

EG-3304: Economic Statistics

EG-3305: Biodiversity

EG-3308: Logical & Analytical Reasoning

## **Elective Paper: Green Chemistry**

**Course Code: EG 3301**

**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 green chemistry.
- (b) To learn Reagents and catalysts in green synthesis:
- (c) To learn basics of Green solvents and selected techniques in green chemistry
- (d) To learn about Comparative study of selected green processes.

Thus, the knowledge from the course can help in the following:

- (a) Basic knowledge of Green chemistry which is important for practical and industrial applications
- (b) The students could pursue a career in chemistry, Industrial chemistry and Post-graduation and also in the field of research in Chemistry.

### **II. Course Content**

#### **Unit 1 Fundamentals of green chemistry (8L)[14 marks]**

*[Prerequisites or topics for Self Study :- Basic terms related to Green chemistry chemistry]*

Introduction, basic principles of green chemistry. Designing a green synthesis: Green starting materials, green reagents, green solvents and reaction conditions, green catalysts.

#### **Unit 2 Reagents and catalysts in green synthesis (7L)[14 marks]**

*[Prerequisites or topics for Self Study: - Basic terms related to Reagents and catalysts]*

- (a) Green reagents: dimethyl carbonate, polymer supported reagents.
- (b) Green catalysts: Acid catalysts, oxidation catalysts, basic catalysts, phase transfer catalysts-Tetra-n-butyl

#### **Unit 3 Green solvents and selected techniques in green Chemistry (8L)[14 marks]**

*[Prerequisites or topics for Self Study :- Basic terms related to solvents and green solvents]*

- (a) Water, ionic liquids, deep eutectic solvents, supercritical carbon dioxide.
- (b) Solid state reactions: solid phase synthesis, solid supported synthesis.

- (c) Microwave assisted synthesis: reactions in water, reactions in organic solvents, solvent free reactions.
- (d) Ultrasound assisted reactions.

**Unit 4 Comparative study of selected green processes**  
**marks]**

**(7L)[14**

*[Prerequisites or topics for Self Study: - Basic terms related to green processes chemistry]*

Comparison of traditional processes versus green processes in the syntheses of Ibuprofen, adipic acid, 4-aminodiphenylamine, p-bromotoluene and benzimidazole.

**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.

**B Sc Semester III**

**IV. Reference books: EG 3301: Green chemistry (Theory)**

- (1) "Green Chemistry: An Introductory Text", by Mike Lancaster, RSC Publishing, Cambridge, UK, 2<sup>nd</sup> Edition, 2010
- (2) "New trends in green chemistry" by V. K. Ahluwalia, M. Kidwai, Anamay Publishers, New Delhi, (2004)
- (3) "Green Chemistry: Environmentally Benign Reactions", Editor: V. K. Ahluwalia, University of Delhi, India Publication 2007.
- (4) "Green Chemistry: Greener Alternatives to Synthetic Organic Transformations" by V.K. Ahluwalia, Narosa Publishing House, 2011
- (5) "Green Chemistry: Environmentally Benign Reactions" by V. K. Ahluwalia, Ane Books India, 2011

**Elective Paper: Electronic Appliances**

**Course Code: EG 3302**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

**Unit – I:** Electrical Appliances: 1) Water Heater; 2) Ceiling Fan; 3) Water Pump and Motors  
4) Different types of Light sources

**Unit – II:** Electronic Appliances: 1) Music System 2) Computer 3) Mobile 4) Television



**Unit – III: Mechanical Appliances:** 1) Different Engines 2) Machines working on different principles of Lever 3) Lift 4) Application of Pulley based appliances.

**Reference:**

1. [www.people.du.ac.in/~snagpal/unit1\\_mod\\_1\\_IN108\\_web.doc](http://www.people.du.ac.in/~snagpal/unit1_mod_1_IN108_web.doc)
2. Principles of Electronics by V. K. Mehta
3. [How](#) Things are works
4. How stuff works

**Elective Paper: Economic Statistics**

**Course Code: EG 3304**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

**Unit-1: Demand & Supply**

1. Ideas of demand and supply laws
2. Demand and supply functions(Curves)
3. Market Equilibrium
4. Revenue.

**Unit-2: Price Elasticity**

1. Concept of price elasticity of demand and supply
2. Interpretations of their values
3. Simple Examples

**Unit-3: Monopoly**

1. Idea of Monopoly
2. Maximization of profit under monopoly Simple Examples.

**Unit-4: Utility**

1. Concept of total utility and marginal utility
2. Maximization of utility
3. Examples

**References:**

1. Gupta, S.C., and Kapoor, V.K.: Fundamentals of Applied Statistics, Sultan Chand Publications
2. R. G. D. Allen: Mathematical Analysis for Economists , Mc Milan and co. limited
3. R. G. D. Allen: Statistics for Economists , Mc Milan and co. limited

Reference Website:

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

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3. [www.math.uah.edu/stat](http://www.math.uah.edu/stat) (Virtual laboratories in Statistics)

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

**Elective Paper: Biodiversity**

**Course Code: EG 3305**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

**UNIT – 1**

Biodiversity – Definition, different levels, importance, threats, Global and local efforts for conservation. Beneficial uses of bacteria and fungi.

**UNIT – 2**

Plant Diversity – Sampling for quantification, different forms, agrodiversity, forests and medicinal plants.

**UNIT – 3**

Study of ultrastructure of a Prokaryotic and Typical Animal Cell, Diversity in cell shape & size, Origin of Life.

**UNIT – 4**

Characteristics of living organism,

Faunal Diversity-General classification of Invertebrates – Protozoa to Annelida, giving suitable examples.

**Elective Paper: Logical & Analytical Reasoning**

**Course Code: EG 3308**

**No. of Credits: 02**

**Learning Hours: 30 hrs**

Number System, LCM and HCF, Divisibility Rules, Factors, Remainders and Factors, Progressions, Number and Letter Series, Calendars, Clocks, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Matching, Logical Connectives, Syllogism, Odd one out

Reference Books:

- 501 CHALLENGING LOGIC AND REASONING PROBLEMS, Gnanadeep, Learning Express, LLC, 2005.
- A Modern Approach to Logical Reasoning , R.S. Aggarwal, S. Chand, First Edition, 2007.
- Analytical Reasoning, N K Pandye, Third Edition, BSC publishing, 2012.