**COURSE CONTENTS OF COMPULSORY/GENERAL FACULTY COURSES FOR BS (2nd SEMESTER w.e.f Fall 2023) PROGRAM IN ZOOLOGY**

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| --- | --- | --- | --- | --- |
| **Year** | **Semester** | **Course Code** | **Course Title** | **Credit Hrs.** |
| **Year-I** | **2nd** | GEN-3201 | Expository Writing | 3(3-0) |
| GEN-3202 | Arabic | 2(2-0) |
| GEN-3203 | Application of Information & Communication Technologies | 3(2-1) |
| BOT-3204 | Diversity of Plants | 3(2-1) |
| ZOO-3205 | Animal Diversity-I | 3(2-1) |
| CHM-3106 | Inorganic Chemistry | 4(3-1) |
|  | | **Total credit hours.** | | **18** |

**GEN-3201 Expository Writing 3(3-0)**

**Aims and Objectives**

After studying this course, students will be able to:

* Improve literal understanding, interpretation & general assimilation, and integration of knowledge.
* Write well organized texts including examination answers with topic/thesis statement and supporting details.
* Write argumentative essays and course assignments.
* Using appropriate strategies for extracting information and salient points according to a given purpose
* Identify the writer's intent such as cause and effect, reasons, comparison and contrast, and exemplification.

**Course Contents**

Unit I:

* Reading skills including skimming, scanning etc.
* Find specific and general information quickly.
* Distinguish between relevant and irrelevant information according to purpose for reading.
* Use the dictionary for finding out meanings and use of unfamiliar words.
* Guess the meanings of unfamiliar words using contextual cues.
* Distinguish between fact and opinion.
* Recognize and interpret cohesive devices.
* Identify main idea/topic sentence.

Unit II:

* Paragraph writing: simple, compound, and complex sentence structure
* Practice exercises with every above-mentioned aspect of reading.
* Characteristics of narrative, descriptive, and argumentative paragraphs
* Identification of tone, diction, voice
* Writing exercises: identification and rectification of fossilized errors.

Unit III:

* Analytical writing: analysis of visual charts, maps, graphs, images; analysis of mundane situations and events.

Unit IV:

* Structure of an Essay: thesis statement, introduction, main body, conclusion.
* Types of Essays: Descriptive, argumentative, expository, discursive, and narrative.
* Reading and carrying out instructions for tasks, assignments and examination questions.
* Enhance academic vocabulary: idiomatic expression, stylistic devices.

Unit IV:

* Content writing. Report Writing. Formal letter and application writing.

Unit V:

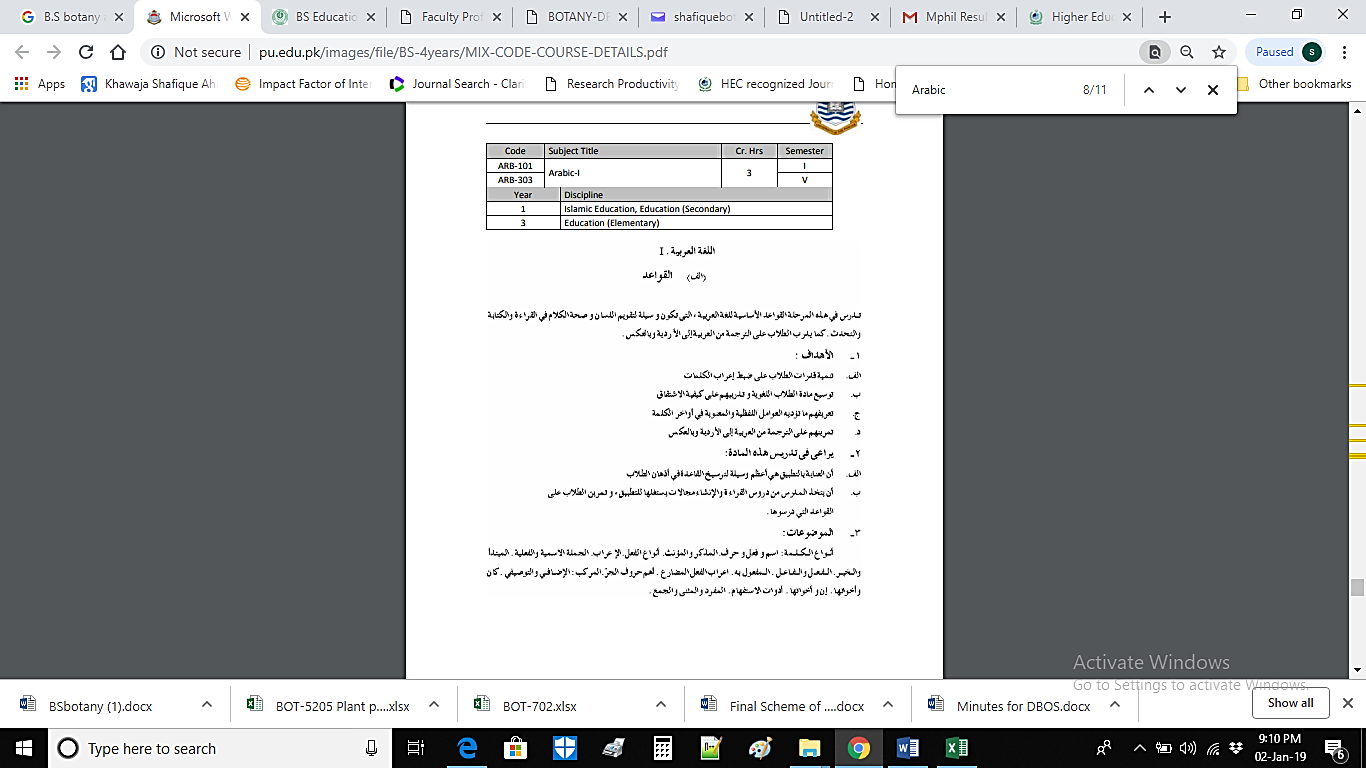
* CV writing.
* Emails, memos, proposals.
* Formal presentations.
* Summarizing articles and charts, graphs etc.

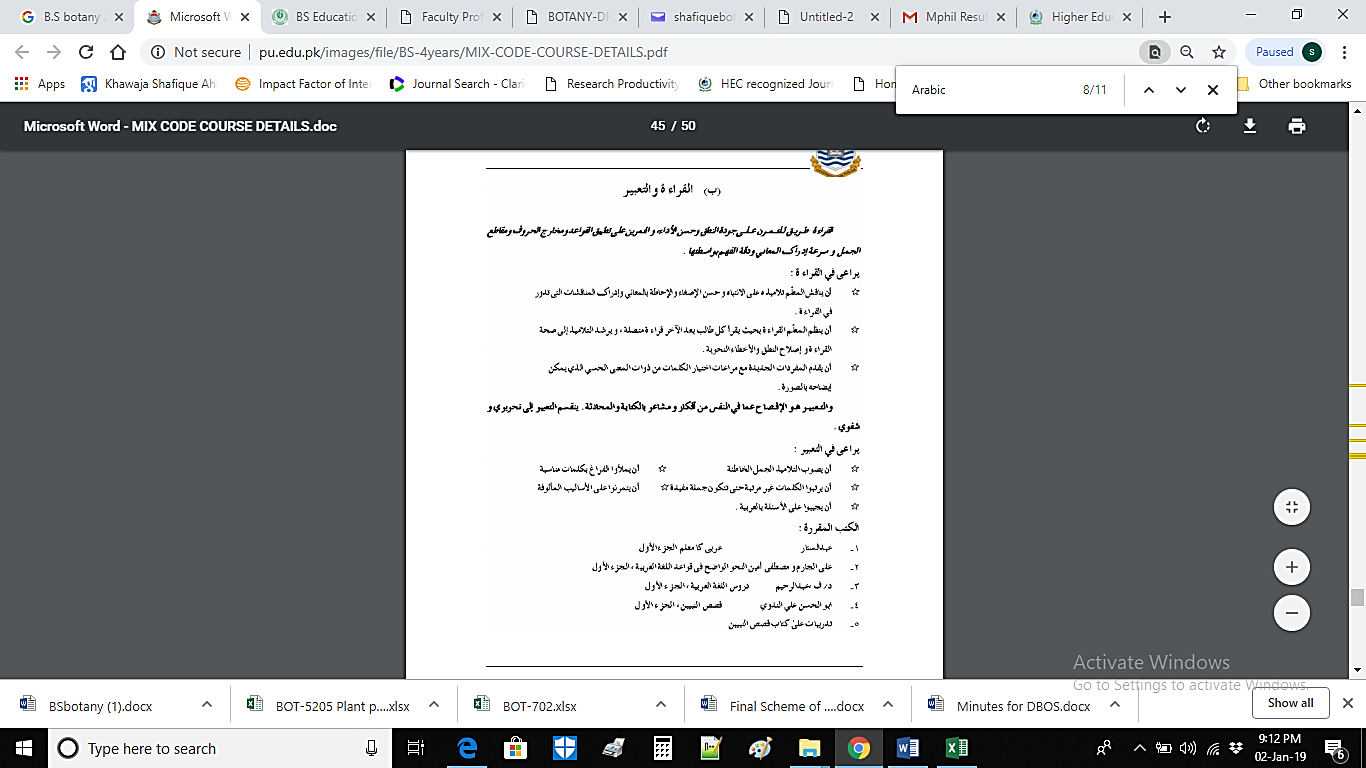
**Suggested Readings**

* Barnet, S. and Beadau, H. (2004*). Critical Thinking, Reading and Writing.* New York: Macmillan Publishing.
* Gardner, P.S. (2003). New Directions. *Reading, Writing and Critical Thinking.*UK: Cambridge University Press.
* Jordan, K.M. and Plakans, L. (2003)*. Reading and Writing for Academic Success*. Michigan: Michigan University Press.
* Smazler, W.R. (1996). *Write to be Read: Reading, Reflection and Writing.* Cambridge: Cambridge University Press.
* Wallace, M. (1992). *Study Skills*. Cambridge: Cambridge University Press.
* Arnaudet, M. L and Barrett, M. (1981). *Paragraph Development*. New Jersey: Prentice-Hall
* Garrison, B. (2007). *Professional Feature Writing.* New York: Routledge
* Crane, M. H*.* (2010). *Expository Writing: Step by Step Lesson*. New York: Brane Publishing.
* MacRae, P. (2015). *Business and Professional Writing*. Canada: Broadview Press
* Marsen, S. (2007). *Professional Writing*. New York: Palgrave

Surma, A. (2005). *Professional and Public Writing*. New York: Palgrave

**GEN-3202 Arabic 2(2-0)**





**GEN-3203 Application of Information & Communication Technologies 3(2-1)**

**Aims and Objectives:**

To familiarize the students with the practical applications of Information and Communication Technologies (ICT) across various sectors

**Course Contents:**

**Unit I: Computer Applications and Software Tools**

* Introduction to productivity software (word processing, spreadsheets, presentations)
* Database management systems and data analysis tools
* Graphics and multimedia software for content creation

**Unit II: Internet and Communication Technologies**

* Web browsing and search engines.
* Email communication and netiquette
* Social media platforms and online collaboration tools

**Unit III: E-Commerce and Online Transactions**

* Introduction to electronic commerce
* Online payment systems and security
* E-commerce platforms and digital marketing

**Unit IV: Educational Applications of ICT**

* E-learning platforms and online education tools
* Virtual classrooms and educational resources
* Gamification and interactive learning experiences

**Unit V: Health Informatics**

* Electronic health records and patient management systems
* Telemedicine and remote health monitoring
* Health-related mobile apps and wearables

**Unit VI: Business and Enterprise Solutions**

* Enterprise resource planning (ERP) systems
* Customer relationship management (CRM) software
* Supply chain management and business analytics

**Unit V: Smart Cities and IoT Applications**

* Concepts of smart cities and urban technology
* Internet of Things (IoT) and sensor networks
* Case studies of IoT applications in urban infrastructure

**Unit VI: Data Security and Privacy**

* Basics of cybersecurity and encryption
* Privacy concerns in the digital world
* Protecting personal and sensitive information

**Unit VII: Future Trends and Innovations in ICT**

* Emerging technologies (AI, blockchain, quantum computing)
* The role of ICT in sustainability and global challenges
* Ethical considerations in the adoption of new technologies

**Practical:**

**Lab Session 1: Productivity Software**

* Introduction to word processing software (Microsoft Word, Google Docs)
* Creating and formatting documents
* Practical exercise: Designing a professional document.

**Lab Session 2: Spreadsheet and Data Analysis**

* Working with spreadsheet software (Microsoft Excel, Google Sheets)
* Data entry, manipulation, and basic formulas
* Practical exercise: Creating a budget or financial analysis.

**Lab Session 3: Presentation Tools**

* Creating effective presentations using software (Microsoft PowerPoint, Google Slides)
* Designing slides, adding multimedia, and transitions
* Practical exercise: Delivering a persuasive presentation.

**Lab Session 4: Internet and Online Communication**

* Web browsing, search engines, and online research.
* Email communication and etiquette
* Practical exercise: Exploring online resources and sending professional emails.

**Lab Session 5: Social Media and Online Collaboration**

* Exploring social media platforms (Facebook, LinkedIn, Twitter)
* Collaborative tools for online teamwork (Google Drive, Microsoft Teams)
* Practical exercise: Creating a collaborative document and sharing it online.

**Lab Session 6: E-Commerce Simulation**

* Simulating an e-commerce transaction using a platform (e.g., Shopify)
* Understanding the steps involved in online purchasing.
* Practical exercise: Setting up a basic online store.

**Lab Session 7: Educational Technology Tools**

* Exploring e-learning platforms (Moodle, Canvas)
* Creating and managing online courses
* Practical exercise: Designing a mini online course module.

**Lab Session 8: Health Informatics Simulation**

* Using health-related mobile apps for monitoring (e.g., fitness trackers)
* Simulating health data collection and analysis
* Practical exercise: Tracking health parameters using a mobile app.

**Lab Session 9: Business Software and Enterprise Solutions**

* Introduction to business software (ERP, CRM)
* Simulating enterprise resource planning processes
* Practical exercise: Managing customer relationships in a CRM system.

**Lab Session 10: IoT and Smart Devices**

* Exploring the Internet of Things (IoT) devices and sensors
* Setting up and collecting data from IoT devices
* Practical exercise: Monitoring environmental parameters using IoT sensors.

**Recommended Books:**

1. Introduction to Information Systems" by R. Kelly Rainer Jr., Brad Prince, and Casey G. Cegielski
2. Information Technology for Management: Digital Strategies for Insight, Action, and Sustainable Performance" by Efraim Turban, Linda Volonino, and Gregory R. Wood
3. Digital Transformation: Survive and Thrive in an Era of Mass Extinction" by Thomas M. Siebel
4. E-Commerce 2022" by Kenneth C. Laudon and Carol Guercio Traver
5. Digital Health: Scaling Healthcare to the World" by Mohit Joshi and Rishi Bhatnagar

**BOT-3204 Diversity of Plants 3(2-1)**

**Aims and Objectives**

To introduce the students to the diversity of plants and their structures and significance.

**Course Contents**

Comparative study of life form, structure, reproduction and economic significance of:

1. Viruses (RNA and DNA types) with special reference to TMV.
2. Bacteria and Cyanobacteria (Nostoc, Anabaena, Oscillatoria) with specific reference to biofertilizers, pathogenicity and industrial importance.
3. Algae (Chlamydomonas, Spirogyra, Chara, Vaucheria, Pinnularia, Ectocarpus, Polysiphonia)
4. Fungi (Mucor, Penicillium, Phyllactinia, Ustilago, Puccinia, Agaricus), their implication on crop production and industrial applications.
5. Lichens (Physcia)
6. Bryophytes (Riccia, Anthoceros and Funaria)
7. Pteridophytes (Fossils and fossilization, Psilopsida (Psilotum), Lycopsida (Selaginella) Sphenopsida (Equisetum), Pteropsida (Marsilea) and Seed Habit)

h) Gymnosperms (Cycas, Pinus and Ephedra)

**Practical:**

1. Culturing, maintenance, preservation and staining of microorganisms.

2. Study of morphology and reproductive structures of the types mentioned in theory.

3. Identification of various types mentioned from prepared slides and fresh collections.

**Recommended Books:**

1. Lee, R.E. 1999. Phycology. Cambridge University Press, UK
2. Prescott, L.M., Harley, J.P. and Klein, A.D. 2004. Microbiology, 3rd ed. WM. C. Brown Publishers.
3. Alexopoulos, C.J., Mims, C.W. and Blackwell, M. 1996. Introductory Mycology. 4th ed. John Wiley and Sons Publishers.
4. Agrios, G.N. 2004. Plant pathology. 8th ed. Academic press London.
5. Vashishta, B.R. 1991. Botany for degree students (all volumes). S. Chand and Company. Ltd. New Delhi.
6. Andrew, H. N. 1961. Studies in Paleobotany. John Willey and Sons.
7. Ingrouille, M. 1992. Diversity and Evolution of Land Plants. Chapman & Hall.
8. Mauseth, J.D. 2003. Botany: An Introduction to Plant Biology 3rd ed., Jones and Bartlett Pub. UK
9. Marti.J.Ingrouille& Plant: Diversity and Evolution. 2006 CUP
10. Taylor, T.N. & Taylor, E.D. 2000. Biology and Evolution of Fossil Plants. Prentice Hall. N.Y.

**ZOO-3205 Animal Diversity-I (Invertebrates) (2-1)**

**Course Objectives**:

1. To provide the knowledge of evolutionary/ phylogenetic relationships (from simple to complex organisms).
2. To impart the basic taxonomic characteristics and classification of all the invertebrate phyla.
3. To provide understanding of body organization, Feeding and Digestive system, Other Organ System.
4. To provide the description of mode of Reproduction and Development
5. To provide the information of their economic and ecological importance

**Course Learning Outcomes**:

This course will be based on following outcomes:

1. Acquire the basic concepts of invertebrates with explanation of evolutionary origin and diversification.
2. Understand invertebrate organismal concepts in laboratory and field.
3. Demonstrate major evolutionary innovations for invertebrates with functional importance.
4. Understand how reproduction and development occurred and able to breed animal in the laboratory/field.
5. Analyze economic and ecological importance of invertebrates.

**Course Contents:**

Note: The minimum details of the titles in the content must be of the principal book Zoology by Miller and Harley. This must be kept in view in teaching and assessments.

**INTRODUCTION**

* 1. Classification of Organisms:
  2. Evolutionary Relationships and Tree Diagrams: Patterns of organization.

**ANIMAL-LIKE PROTISTS: THE PROTOZOA**

* 1. Evolutionary perspective; Life within a single plasma Membrane.
  2. Symbiotic Lifestyles.
  3. Protozoon Taxonomy; (up to Phyla, subphyla and super Classes, wherever applicable).
  4. Pseudopodia and Amoeboid Locomotion; Cilia and other pellicular structures.
  5. Nutrition; Genetic Control and Reproduction; Symbiotic ciliates.
  6. Further Phylogenetic Consideration.

**MULTICELLULAR AND TISSUE LEVELS OF ORGANIZATION**

* 1. Evolutionary Prespective:
  2. Origins of Multicellularity; Animal Origins.

**Phylum Porifera**

* + 1. Characteristics and classification. Cell Types, Body Wall, and

Skeletons.

* + 1. Water Current and Body Forms.
    2. Maintenance Functions, Reproduction.

**Phylum Cnidaria (Coelenterate)**

* + 1. Characteristics and classification. The body Wall and Nematocysts:

Alteration of Generations.

* + 1. Maintenance Functions; Reproduction and
    2. Classification up to Class.

**Phylum Ctenophore.**

a. Characteristics, body organization

**THE TRIPLOBLASTIC AND WITH ACOELOMATE BODY PLAN PHYLUM PLATYHELMINTHES**

* + 1. Evolutionary Perspective; Classification up to class.
    2. The Free-Living Flatworms and the Tapeworms, adaptive modification for parasitic lifestyle

**Phylum Numerate:** Characteristics, body organization.

**Phylum Gastrotrich:** Characteristics, body organization

1. **PSEUDOCOELOMATE BODY PLAN**

**PHYLUM ASCHELMINTHS**

* + 1. Evolutionary perspective; General Characteristics; Classification up to order with External Features.
    2. Feeding and Digestive system; Other Organ System; Reproduction and Development including Phylum **Rotifera,** Phylum **Nematoda** and Phylum **Kinorhyncha**.
    3. Some Important Nematode Parasites of Humans.

1. **PHYLUM MOLLUSCA** 
   * 1. Evolutionary perspective; Relationship to other animals; Origin of the

Coelom.

* + 1. Molluscan Characteristics, Classification up to class. The

Characteristics of Shell and Associated Structures,

* + 1. Feeding, Digestion, Gas Exchange, Locomotion,
    2. Reproduction and Development, Other maintenance Functions and Diversity in Gastropods, Bivalves and Cephalopods:

1. **PHYLUM ANNELIDA** 
   * 1. The Metameric Body Form; Evolutionary perspective; Relationship to other animals,
     2. Metamerism and Tag-matization, Classification up to Class. External

Structure and Locomotion,

* + 1. Feeding and the Digestive system, Gas Exchange and Circulation,
    2. Nervous and Sensory Functions, Excretion,
    3. Regeneration, Reproduction and Development, in Polychaeta, Oligochaeta and Hirudinea, Further Phylogenetic Consideration.

1. **PHYLUM ARTHROPODA:** 
   * 1. Evolutionary Perspective: Classification and Relationship to other

Animals.

* + 1. Metamerism and Tagmatization
    2. The Exoskeleton; Metamorphosis.
    3. Classification up to Class; Further Phylogenetic Consideration.

**The Hexapods and Myriapods:**

* + 1. Evolutionary Perspective: Classification up to class. External

Structure and Locomotion,

* + 1. Nutrition and the Digestive system, Gas Exchange, Circulation and

Temperature Regulation,

* + 1. Nervous and Sensory Functions, Excretion, Chemical Regulation,
    2. Reproduction and Development in Hexapoda,
    3. Insects Behavior, Insect and Human.

10. **PHYLUMECHINODERMS**

1. Evolutionary Perspective: Relationship to other Animals; Echinoderm Characteristics; Classification up to class.
2. Maintenance Functions, Regeneration,
3. Reproduction, and Development in Asteroida, Ophiuroidea, Echinoidea, Holothuridea and Crinoidea.

**SOME LESSER-KNOWN INVERTEBRATES**.

a. The Lophophorates, Entoprocts, Cycliophores, and Cheatognaths.

**Practical:**

**Note:** Classification of each member of each phylum up to order with adaptations in relation to habitat of the specimen. Preserved Specimen and or colored projection slide and or CD ROM projection of computer must be used.

1. Study of Euglena, Amoeba, Endameba, Plasmodium, Trypanosome, Paramecium as representative of animal like Protists.
2. Study of prepared slides of sponges, spicules of songs, and their various body forms. Study of representatives of classes of Phylum Porifera.
3. Study of principal representatives of classes of Phylum Coelenterate.
4. Study of principal representatives of classes of Phylum Platyhelminthes.
5. Study of representatives of phylum Rotifer, Phylum Nematode.
6. Study of principal representatives of classes of Phylum Mollusca.
7. Study of principal representatives of classes of Phylum Annelida.
8. Study of principal representatives of classes of groups of Phylum Arthropoda
9. Study of representatives of classes of phylum Echinodermta.
10. Preparation of permanent mount of Leucosolenia, Obelia, Hydra, Proglottid of Tapeworm, Parapodia of Nereis and Daphnia. Drawing and labeling.
11. Preparation of permanent slide of mouthpart of insects (after dissection). Drawing and labeling.
12. How to make grade-wise series for preparation of temporary and permanent slides.

**Teaching Methodology:**

* + Lecturing
  + Written Assignments
  + Guest Speaker
  + Research project
  + Presentation

**Assignments & Presentation (10%)**

**Recommended Principal Reference Book:**

1. Miller, A.S. and Harley, J.B.; 1999, 2002., 2007, 2009, 2012 & 2016 Zoology, 4th, 5th, 6th, 7th, 8th, 9th& 10th Edition (International), Singapore : McGraw Hill.

**Additional Readings:**

1. Schierwater, B., &DeSalle, R. (2021). Invertebrate zoology: a tree of life approach. CRC Press.
2. Hickman, C.P., Roberts, L.C/, AND Larson, A., 2018. INTEGRATED PRINCIPLES OF ZOOLOGY, 15th Edition (International), Singapore: McGRAW-Hill.
3. Mandal, F. B. (2017). Biology of Non-chordates. PHI Learning Pvt. Ltd.
4. Pechenik, J.A., 2015. BIOLOGY OF INVERTEBRATES, 7th Edition,

(International), Singapore: McGraw-Hill.

1. Hickman, C.P., Roberts, L.C/, AND Larson, A., 2007. INTEGRATED PRINCIPLES OF ZOOLOGY, 12th& 13th Edition (International). Singapore: McGraw-Hill.
2. Sandhu, G. S. (2005). Textbook of invertebrate zoology (Vol. 1). Campus Books International.
3. Campbell, N.A., 2002; BIOLOGY 6th Edition, Menlo Park, California; Benjamin Cummings Publishing Company, Inc.
4. Kent, G. C. and Miller, S., 2001. COMPARATIVE ANATOMY OF VERTEBRATES New York: McGraw-Hill.

**BOOKS FOR PRACTICAL**

1. Verma, P. S. (2010). A Manual of Practical Zoology: Invertebrates. S. Chand Publishing.
2. Miller, S.A., 2002. GENERAL ZOOLOGY LABORATORY MANUAL. 5th

Edition (International), Singapore: McGraw-Hill.

1. Hickman, C.P. and Kats, H.L., 2000. Laboratory Studies in integrated principle of zoology. Singapore: McGraw-Hill.

**CHE-3206 Inorganic Chemistry 4(3-1)**

**Course Objectives:** Students will not only be able to understand and acquire knowledge about basic concept of inorganic chemistry, but this course will also help in developing their knowledge about the modern periodic table and basic theories of chemical bonding. This course will provide a rigorous description of chemical equilibrium phenomena and their application during chemical reactions or analysis. They will be able to understand the acid base concepts and relative strength of acids and bases. They can understand the abnormal behavior of the p-block elements, general properties and important uses of these elements and their compounds. Students will also be able to know about basic laboratory ethics and necessary precautionary measures required to carry out chemical reactions in the laboratory and will be able to prepare some important compounds in the laboratory. They will also be able to analyze different radical present in the salts.

**Course Contents:**

1. **Periodicity:** Modern periodic table, similarities and differences among first row elements, their diagonal and vertical relationship with other elements, group trends and periodic properties in s, p, d and f block elements i.e., atomic radii, ionic radii, ionization potentials, electron affinities, electronegativities and redox potential.

**2.Theories of Chemical Bonding**: Nature and types of chemical bonding. Concept of valence bond theory (VBT) and molecular orbital theory (MOT), Valence shell electron pair repulsion (VSEPR) theory. Directed valence bond theory (hybridization) and their applications to homo and hetero di-atomic inorganic molecules. Metallic bonds.

**3.Acid-Base Concept:** Theories of acids and bases, applications of soft and hard acid-base (SHAB) concept. pH, pKa, pKb and their significance. Relative strength of acids and bases based on pka values. Leveling effect. Buffers, indicators and theory of indicators.

**4.Essentials of Chemical Analysis:** Law of mass action and its applications, precipitation and solubility product, common ion effect and its application, co-precipitation, fractional precipitation.

**5. Chemistry of p-Block Elements**

(a) Boron and Aluminum: General characteristics, group anomalies, structure, bonding and properties of boron and aluminum hydrides.

(b) Carbon and Silicon: General characteristics, comparison of carbon and silicon, allotropic forms of carbon. Structure and industrial applications of carbides, silicates and silicones.

(c) Nitrogen and Phosphorus: General characteristics, group anomalies. Role of oxides of nitrogen in the environment, preparation of nitric acid and ortho phosphoric acid.

(d) Oxygen and Sulphur: General characteristics, group anomalies, role of oxides of sulfur in air pollution. Preparation of sulfuric acid. Preparation of hypo and its use in photography.

(e) Halogens: General characteristics, anomalous behavior of fluorine, industrial preparation and uses of fluorine. Structure and properties of Interhalogens and pseudohalogens.

(f) Noble Gases: Discovery of noble gases, structure and properties of xenon fluorides, Industrial uses of noble gases and their compounds.

**6. Chemistry of d-Block Elements:**

Electronic configuration and general characteristics of d-block elements. Industrial applications of transition metals. Werner’s concept and nomenclature of coordination compounds.

**Inorganic Chemistry Practical**

**1.Laboratory Ethics and Safety Measures:** Awareness about the toxic nature of chemicals and their handling, cleaning of glassware, safe laboratory operations

**2. Qualitative Analysis:** Analysis of four ions (two cations and two anions) from mixture of salts.

**3. Quantitative Analysis**

1. Determine the %age purity of NaCl (rock salt) by Mohr's method.

2. Determination of number of water molecules (x) in CuSO4.XH2O iodometrically.

3. Determination of amount/dm3 of FeSO4.7H2O with K2Cr2O7 by both internal and external indicators.

4. Determination of %age of iron in Ferric alum (NH4)2SO4 Fe2(SO4)3.24H2O using K2Cr2O7 by both internal and external indicators.

5. Standardization of EDTA solution by Magnesium Sulfate/Zinc Sulfate solution by complexometry. 6. Find out the amount of Ca2- in the given sample of marble (limestone) by complexometry.