HU110ENGLISH

HU110	ENGLISH	3-0-2

COURSE OBJECTIVE:

The objective of this foundational course is to develop the second language learners' ability to use the four fundamental language skills – listening, speaking, writing and reading. The objective of this laboratory is to practice English phonetics through audio & visual aids and computer software. It intends to enable student to speak English correctly with confidence.

COURSE CONTENT:

Unit I

Grammar – Applied Grammar and usage, Parts of Speech, Articles, Tenses, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure, Punctuations.

Unit II

Vocabulary Development – Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Derivation from root words, Jargon, Scientific Jargon.

Unit III

Developing Reading Skills – Reading Comprehension, Process, Active & Passive Reading, Reading Speed Strategies, Benefits of effective reading, note-making, note- taking, Reading comprehension of technical material and SQ3R reading technique

Unit IV

Developing Writing Skills – Planning, Drafting & Editing, Writing with style, right-words selection, writing effective sentences, developing logical paragraphs, art of condensation, précis, essay, technical definition and technical description

Unit V

Business Correspondence – Business Letters, Parts & Layouts of Business Letters, Writing Resume/ Application Calling/ Sending Quotations/ Orders/ Complaints and E-mails

Topics for the Laboratory:

1. Basic Grammar & Vocabulary Practice (Synonyms, Antonyms, Analogies, Sentence Completion, Correctly Spelt Words, Idioms, Proverbs, Common Errors.
2. Phonetic Symbols, Pronunciations
3. Listening Skills – Including Listening Comprehension
4. Extempore and JAM (Just a Minute Session)
5. Role Play – I
6. Role play – II
7. Body Language
8. Debate
9. Oral Presentation – Preparation & Delivery using Audio – Visual Aids with stress on body language and voice modulations. (Topics to be selected by the Instructor)

COURSE OUTCOMES

Student after successful completion of course must possess sound language skills. They must also feel confident in communicating their ideas and feelings.After laboratory exercises, students must possess sound language skills. They must also feel confident in communicating their ideas to others.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment. Laboratory assessment will be based on assignments, presentations, and interview of each candidate.

REFERENCES

A.J. Thomson and A.V. Martinet, A Practical English Grammar, Oxford IBH Pub
Sanjay KumarmPushpLata, English for Effective Communication, Oxford

HU111COMMUNICATION

HU111	COMMUNICATION	0-2-0

COURSE OBJECTIVE:

The objective of this course is to help students to acquire reading and writing skills in a self-learning mode.

COURSE CONTENT:

Exercises to be performed by students:

- Reading text selection from the list given below
- To write a book-review

COURSE OUTCOMES

Student after successful completion of course must possess sound comprehension skills. They must also feel confident in writing reviews and comments on the read material.

EVALUATION

Evaluation will be continuous an integral part of the class. Assessment will be based on assignments, presentations, and interview of each candidate.

REFERENCES

1. My Experiments with Truth by Mahatma Gandhi
2. Wings of Fire by Dr. APJ Abdul Kalam
3. History of Everything by Stephen Hawkings
4. A Passage to India by E.M. Forster
5. The Argumentative Indian by Amartya Sen
6. The Old Man and the Sea by Ernest Hemingway
7. Life of Pi by William Dalrymple
8. The Alchemist by Paulo Coehlo
9. The Eighth Habbit by Stephen Covey
10. The Road Less Travelled by M.Scott Peck

ML110ENVIRONMENTAL SCIENCES

ML110	ENVIRONMENTAL SCIENCES	2-0-0

COURSE OBJECTIVE:

This course introduces students to environment concerns. Students are expected to learn about environment, factors affecting it, environmental ethics and its protection through lectures, presentations, documentaries and field visits.

COURSE CONTENT:

Unit I

Introduction: Domestic and Global Environmental concerns, principles of sustainable development, Sustainable agriculture, organic farming, bio-fuels, Threats for sustainability

Unit II

Environmental Ethics & Legislations: Enforcement of Environment laws in India – The water act, The Air (Prevention and Control of Pollution) Act, 1981, The Environment (Protection) Act, 1986, Environmental Auditing

Unit III

Environmental Pollution: Air Pollution – sources, types of air pollutants, National Ambient Air Quality Standards,Controlling Air Pollution. Water pollution – sources, types of water pollutants, water quality indicators, water quality standards. Soil Pollution - types of soil pollutants: industrial wastes, pesticides, fertilizers and manures, salination of soil, Controlling Soil Pollution.

Unit IV

Environmental Challenges: Local Challenges - Solid Waste – Impact of solid waste on natural resources, Deforestation; Global Challenges - climate change and global warming, Kyoto Protocol, Greenhouse Gases, Ways to reduce Greenhouse gases emissions, Carbon Footprint, ways to reduce carbon footprint, Carbon Trading.

Unit V

Sustainable habitat, industrialisation and urbanization: Concept of Green Building, Volatile Organic Compounds (VOC), GRIHA Rating, LEED Rating, HVAC, Hybrid Car Technology, Industrial ecology, India's renewable energy capacity.*Green Technology & Green Business:* Green Business, Green Computing, E-waste management.

COURSE OUTCOMES

Student after successful completion of course must possess an understanding of environment, eco-system and its consequences of unbalancing the environment. After successful completion of this course, student will earn 2 credits.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES

R. Rajagopalan, Environmental Studies, Oxford IBH Pub, 2011.
Kogent Learning Solutions Inc., Energy, Environment, Ecology and Society, Dreamtech, 2012.
Rag, R. L, Ramesh, LekshmiDinachandran, Introduction to sustainable engineering

PY110BIOLOGY

PY110	BIOLOGY	3-0-4

COURSE OBJECTIVE:

To provide students with a basic foundation in the fundamental concepts and knowledge base of modern biology and help students develop the skills that are integral to the process of various disciplines of pharmaceutical sciences. This course provides a coherent framework for understanding basics of botany and zoology and prepares students for their upper-level subjects like pharmacognosy, biotechnology, microbiology, and human anatomy and physiology.

COURSE CONTENT:

Theory:

Significance of basics of biology in pharmaceutical science. Cell (Plant and animal): its structure, living and non-living inclusions, cell cycle and cell division, stages of mitosis, meiosis and their significance.

Elementary tissues of the human body: epithelial, connective, muscular and nervous tissues.
Different types of plant tissues and their functions.

Morphology and histology of plant parts: root, stem, bark, wood, leaf, flower, fruit and seed.
Modifications of roots and stems.

Physiology of plants: photosynthesis, respiration and transpiration.

Plant Taxonomy: Classification of plant kingdom. Study of the following families with special reference to medicinally important plants: apocynaceae, solanaceae, umbelliferae, labiatae, leguminosae, and liliaceae.
Introduction to plant products of economic importance like plant drugs, dyes, fibers, spices, scents, beverages, resins.

Introduction to animal products of economic importance like animal biological products, honey, pearl, lac, silk, lather, etc.

Animal kingdom: Classification and its basis. Fundamentals of parasitology, general morphology and life history of internal parasites like plasmodium, taeniasolium(tapeworm). General structure and life history of insects like mosquito.

Basic study of the following systems of frog: Gastro Intestinal (Digestive enzymes), nervous, cardiovascular: genitourinary (glands and hormones), musculo-skeletal, respiratory systems.

Simple and compound microscopes used in biology. Origin and evolution of life: an outline.
Fundamental laws of inheritance: Mendel's law. Molecular basis of inheritance – DNA, RNA, replication, transcription, genetic code and translation.

Practical: **Experiments based on theory**

COURSE OUTCOMES

After completion of course, student should be able to:

- Understand the structures and functions of basic components of prokaryotic and eukaryotic cells.
- Understand the process of cell division in both somatic and germ cells.

- Understand general terminology of plant structures, morphology, internal anatomical features and families.
- Understand the economical importance of products of animals and plants.
- Understand formation of RNA, DNA, proteins and process of inheritance.
- Understand the organ systems of frog and human parasites.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES:

1. *Dutta A.C., "Botany for Degree students", 20th edition, Oxford university press publisher, 2006.*
2. *Vidyarthi R.D., Pandey P. N., "A Text Book of Zoology", 1st edition, S Chand & Co. Pvt. Ltd. Publisher, 2006.*
3. *John E. Hall, Guyton & Hall: "Textbook of Medical Physiology", 13th edition, WB Saunders Company, 2015.*
4. *Bhatia K.N., "Truemans: Elementary Biology", Vol. II, 27th edition, Trueman book company-New Delhi, 2014.*
5. *Evans W. C., "Trease and Evans Pharmacognosy", 16th edition, Saunders Ltd, 2009.*
6. *NaliniChandar, Cell and Molecular Biology (Lippincott's Illustrated Reviews Series), Lippincott Williams & Wilkins publisher, 2012.*

PY111PHYSICAL PHARMACY-1

PY111	PHYSICAL PHARMACY-1	3-0-4

COURSE OBJECTIVE:

To develop an understanding of some basic principles of physical chemistry having applications in various pharmaceutical operations, drug properties and drug formulations.

COURSE CONTENT:

Theory:

States of Matter: Binding forces between molecules. Gaseous State: Ideal Gas law; kinetic molecular theory. Liquid state: Liquefaction of gases, vapor pressure of liquids, boilingpoint.Crystalline and amorphous solids and polymorphism, melting point and heat of fusion.Liquid crystalline state, supercritical fluid state.

Phase equilibria and phase rule: Two component systems, Eutectic mixtures; solid dispersions; phase equilibria in three component systems; rules relating to triangular diagram.

Thermodynamics: Basics of Thermodynamics. First, second and third laws of thermodynamics with special emphasis to their applications in pharmacy.

Nonelectrolytes: Types of solutions; Ideal and real solutions. Colligative properties: Lowering of the vapor pressure, elevation of the boiling point, depression of the freezing point; osmotic pressure. Molecular weight determination.

Solutions of electrolytes: Electrolysis, strong and weak electrolytes, colligative properties of electrolytic solutions and concentrated solutions of non-electrolytes. Arrhenius theory of electrolytic dissociation: Drugs and ionization; degree of Dissociation. Osmolality.

Ionic Equilibria: ionization of water; ampholytes. Sorensen's pH: Conversion of hydrogen ion concentration to pH, pK and pOH.

Buffered and isotonic solutions: Common Ion Effect and the buffer equation. Drugs as Buffers.Buffer capacity.Buffers in pharmaceutical system and biological system.Buffered isotonic solutions.

Solubility and distribution phenomena: General principles. Solvent-solute interactions: Solubility of gases in liquids, liquids in liquids and solids in liquids. The influence of solvents on the solubility of drugs; combined effect of pH and solvents; hydrotropic solubilization; influence of surfactants. Distribution of solutes between immiscible solvents.

Practical:

1. *Determine the Molecular weight of the given substance with Freezing Point Depression Method (Rast camphor method)*
2. *Perform the identification and characterization of polymorphs of the given drug* ***or*** *Studies on polymorphs, their identification and properties.*
3. *Construct the ternary phase diagram for three-component system (oil-water-surfactant/alcohol, water and benzene).*
4. *Determine the Critical solution temperature of phenol water system.*
5. *Prepare the pharmaceutical buffers and determine its buffer capacity.*
6. *Prepare acetate buffer and compare theoretical pH value with the experimental value.*
7. *Determine the ionization constant by conductivity method/ distribution method.*
8. *Perform experiments involving tonicity adjustments*
9. *Determine critical solution temperature of phenol water system.*

10. *Determine the effect of addition of electrolyte on critical solution temperature of phenol- water system.*
11. *Determine partition coefficient of given compound between carbon tetrachloride/ benzene/ octanol and water system*
12. *Determination of distribution coefficient of given substance between two immiscible liquids . (benzoic acid /succinic acid between ether / benzene and distilled water).*
13. *Determine the heat of solution of Salicylic/benzoic/oxalic acid*
14. *Determine the saturation solubility of given drug in water.*
15. *Determine the solubility of given compound in different solvents.*
16. *Determination of effect of pH on solubility.*
17. *Determine the effect of co solvents on solubility of given drug in water*
18. *Determine the effect of temperature on solubility of solid in liquid.*
19. *Determine the solubility of given substance at different temperatures.*
20. *Determine the effect of salt on the solubility of given drug.*

COURSE OUTCOMES

Students achieve knowledge related to states of matter, thermodynamics, phase rules, electrolytes, solutions and chemical reaction.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES:

1. *Patrick J. Sinko, Martin's Physical Pharmacy and Pharmaceutical Sciences, Sixth Edition, 2011, Lippincott Williams & Wilkins.*
2. *Rawlins, E.A., Bentley's Text Book of Pharmaceutics, Eighth Edition, 2010, Elsevier/BSP Books Pvt. Ltd.*
3. *Joseph, K. H. Ma, Hadzija, B., Basic Physical Pharmacy, 2012, Jones &Bartlette.*
4. *P W Atkins, the Elements of Physical Chemistry, 2nd Ed., OUP, 1996*
5. *P W Atkins, Physical Chemistry 7th Ed., OUP, 2002*
6. *B G Cox, Modern Liquid Phase Kinetics, Oxford Science Publications, 1994.*
7. *J.R. Barrante: Physical Chemistry of Life Sciences, Printeil.*
8. *K.J. Laidler: Physical Chemistry with Biological Applications, Benjamin.*
9. *S.C. Wallwork: Physical Chemistry for Students of Pharmacy and Biology, Longman.*
10. *L. M. Atherden: Bentley and Driver's-Textbook of Pharmaceutical Chemistry, Oxford University Press, Delhi.*
11. *A.J. Mce: Physical Chemistry, E.L. B.S., London.*
12. *H.H.Willard, L.L. Merritt and J.A. Dean: Instrumental Methods of Analysis, Van Nostrand Reinhold, New York.*
13. *Samuel Glasstone and David Lewis: Elements of Physical Chemistry, Macmiilan Press, London.*
14. *A.H. Beckett and J.B. Staenlake: Practical Pharmaceutical Chemistry, Vol. I and II. The Athlone Press of the University of London.*
15. *Gross J.M. and Wiseall B. Principle of Physical Chemistry, Macdonald and Evans Plymouth, England.*
16. *Gareth Morris J. A Biologists Physical Chemistry, Edward Arnold, London.*
17. *Chang R. Physical Chemistry with Application to Biological System. Collier Macmilliar Publisher, London.*
18. *Barrow G.M. Physical Chemistry. McGraw-Hill, London.*

PY112PHARMACEUTICAL CHEMISTRY-1 (INORGANIC CHEMISTRY)

PY112	PHARMACEUTICAL CHEMISTRY-1 (INORGANIC CHEMISTRY)	3-0-4

COURSE OBJECTIVE:

Pharmaceutical Chemistry-I provides the systematic study of a selection of elements of the periodic table; in addition, the students will become familiar with the most important general principles applied to the chemistry of transition elements. They will also be provided with a general understanding of Bioinorganic Chemistry, pharmaceutical inorganic chemistry and physiological inorganic chemistry.

COURSE CONTENT:

Theory:

Elements and periodicity: Modern periodic law and present form of the periodic table, s, p, d and f block elements, periodic trends in properties of elements- atomic and ionic radii, ionization enthalpy, electron gain enthalpy, valence, oxidation states and chemical reactivity.

Sources of impurities in pharmaceutical substances: Importance of limit test and general principles and procedure for limit tests of chloride, sulphate, iron, arsenic, lead and heavy metals.

Inorganic Agents: Occurrence, preparation, physical characteristics, chemical properties, purity test, incompatibilities, assay and pharmaceutical uses of inorganic official compounds (IP) of the following elements; Aluminum, Sodium, Potassium, Calcium, Magnesium, Lithium, Iron, Copper, Silver, Antimony, Iodine, Boran, Zinc, Mercury, Selenium.

Reagents: Preparation, properties and uses of the following reagents; Nesslers reagent, boron trifluoride, Grignard reagent, Potassium permanganate, potassium dichromate, Hydrogen peroxide, Iodine solution.

Bioinorganic Chemistry: The essential trace metals, Introduction to Inorganic Biochemistry. Metal ion transport and storage. Oxygen transport and storage. Biological redox processes. Zn(II): natural Lewis acid.

Major Intra and extra cellular electrolytes: Major physiological ions, electrolytes used in replacement therapy, physiological acids-base balance, electrolytes used in acid-base therapy, electrolyte combination therapy.

Radiopharmaceuticals: Basic properties, production, quality control, stability, clinical and medicinal applications of radioisotopes used in pharmacy and medicine preparations of diagnostic and therapeutic agents.

Practical:

1. Perform limit test for chloride insomepharmacopoeialcompounds.
2. Perform limit test for sulphate insomepharmacopoeialcompounds.
3. Perform limit test for lead insomepharmacopoeialcompounds.
4. Perform limit test for arsenic insomepharmacopoeialcompounds.
5. Perform limit test for heavy metals insomepharmacopoeialcompounds.
6. Perform limit test for iron insomepharmacopoeialcompounds.
7. Prepare and identification test of ferrous sulphate.
8. Prepare and identification test of ferric ammonium citrate.
9. Prepare and identification test of light and heavy magnesium oxide.
10. Prepare and identification test of magnesium carbonate.
11. Prepare and identification test of calcium carbonate.
12. Prepare and identification test of zinc sulphate.
13. Prepare and identification test of alum.
14. Prepare and identification test of Boric acid.
15. Prepare and identification test of Aluminium hydroxide gel.
16. Prepare and identification test of yellow mercuric oxide.
17. Prepare and identification test of magnesium triclicate.
18. Prepare and identification test of copper sulphate.
19. Prepare and identification test of sodium thiosulphate.

20. Prepare and identification test of Disodium hydrogen citrate.
21. Prepare and identification test of magnesium sulphate.

COURSE OUTCOMES

- Know descriptive chemistry of some of the representative elements and their official compounds, with special emphasis on their reactions and its applications, mainly those of pharmaceutical interest.
- Preparation and application of important reagents for analysis of pharmaceutical compounds and identification of impurities present in formulations.
- Know the role of elements and compounds in the processes of life.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES:

1. *Bentley & Driver's Text Book of Pharmaceutical Chemistry Revised by L. M. Atherden, 8th edition, Oxford Medical Publications.*
2. *Pharmacopoeia of India, Govt. of India, Ministry of Health, Delhi.*
3. *J.H. Block, E. Roche, T.O. Soine and C. O. Wilson: Inorganic Medicinal and Pharmaceutical chemistry, Lee Febiger, Philadelphia. PA.*
4. *Roger's Inorganic Pharmaceutical Chemistry of Lea and Febiger, Philadelphia, USA.*
5. *M. Ali: Text book of Pharmaceutical Inorganic chemistry, CBS, New Delhi.*
6. *Mellor's Modern Inorganic Chemistry, Longman Green and Co., Ltd., London.*
7. *Beckett &Stenlake, Practical Pharmaceutical Chemistry*
8. *Liptrot G.F. Modern Inorganic Chemistry, Blantyre Printing*
9. *British Pharmacopoeia, Stationary Press, Royal Society of Pharmaceutical Press, London.*
10. *United State Pharmacopoeia, United State Pharmacopoeial Convention, Inc., 12601. Twinbrook Parkway, Rockyville M.D. 20852 USA.*
11. *Lovis F. Fiesev D.C. Experiments in Inorganic Chemistry, Health and Company, Boston.*
12. *Vogel Text Book of Quantitative Chemical Analysis, Longman, London.*
13. *Vogel's Text Book of Quantitative Analysis, 5th Ed.*
14. *Vogel's Quantitative Inorganic Analysis.*
15. *Wilson &Gisvold's Principles of Organic and Medicinal Chemistry.*
16. *Remington Practical of the Science and Pharmacy, Mack Publishing Company, Eston, Pennsylvania, USA.*

PY113 INTRODUCTION TO PHARMACY

PY113	INTRODUCTION TO PHARMACY	3-0-0

COURSE OBJECTIVE:

This course provides the students an overview of Pharmacy and its allied disciplines. The students will be introduced to the history and evolution of pharmacy education and its contribution to modern pharmacy profession. The course will also impart knowledge on major disciplines of pharmaceutical sciences and familiarize them to official/compendial literature of pharmacy, alternative systems of medicines and also the terminology employed in various pharmacy subjects. The Students are also expected to learn about scope, current and future trends of pharmacy profession, jobs, innovations & research opportunities in the field of Pharmacy. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

COURSE CONTENT:

INTRODUCTION

General overview of pharmacy profession.Brief history of pharmacy education and pharmacy profession from ancient period to evolution of modern pharmacy practice, Introduction to various alternative systems of medicine.

PHARMACY EDUCATION

Introduction to major branches/disciplines of Pharmaceutical sciences: Pharmaceutics, Pharmaceutical Chemistry & Pharmaceutical Analysis, Pharmacology, Pharmacognosy, Pharmacy practice, Pharmaceutical Biotechnology, Cosmetic Technology, Pharmaceutical Management & other related subjects. Brief overview of all these disciplines and importance in pharmaceutical education and profession.

Literature & Terminologies

General understanding of compendial books and official Literatures of Pharmacy: Indian Pharmacopoeia, United States Pharmacopoeia, British Pharmacopoeia, British Pharmacopoeial Codex, European Pharmacopoeia, Ayurvedic Pharmacopoeia, Herbal Pharmacopoeia, National Formulary and other Formularies. Various reference textbooks like Remington's Pharmaceutical sciences, Encyclopedia, etc. and active websites.

Glossary and technical terminologies of Pharmacy. Latin terms used for drug prescription. Meaning of various symbols and terms of pharmaceutical & allied sciences.Definitions of common pharmacological drug categories.

SCOPE & OPPORTUNITIES

Pharmaceutical Industries (Manufacturing & Service)

Overview of Pharma Industries in India (Manufacturing & Service); Current status, contribution to GDP, export and growth potential, organizational structure, manpower requirement, and future prospects. Employment opportunities, Nature of Job, risks and challenges involved, new job avenues in emerging & interdisciplinary areas of pharma manufacturing.

Health Sector

Overview of Indian healthcare sector, current status & growth potential.Role & importance of pharmacists in healthcare management system, Code of ethics of Pharmacy profession, Pharmacist's oath. Present & future job prospects in Indian Healthcare sector.

Innovation and Research

Overview of notable National Research Organizations/ Authorities/ Societies/ Forums such as CDRI, IICTE, NCL, IIIM, ICGEB, IISC, NIPER, CCMB, CSIR, ICMR etc. Emerging areas and new technologies in pharmaceutical sciences.

REGULATORY AGENCIES OF PHARMA EDUCATION & INDUSTRIES

Introduction to regulatory body of Pharmacy education and industries like- PCI, AICTE, FDA, WHO, CDSCO, Ministry of AYUSH, Ministry of Chemicals & Fertilizers, Dept. of Pharmaceuticals. Career opportunities in drug control & administration.

COURSE OUTCOMES

After successful completion of course, students are expected to possess an in-depth understanding and knowledge about the scope of pharmaceutical education &pharmacy profession, terminologies, learning resources and career-opportunities in field of pharmacy and its allied disciplines.

EVALUATION

Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES:

All other course materials will be provided by the instructor.