

B.PHARM. – I SEMESTER

Course Code	Course	L	T	Credits
PHSC 111	Professional Communication	2	1	3
		Hours Per Week		

Professional Communication

Theory: 2h/week

English grammar- Parts of speech, articles, preposition, tenses, active and passive speech, direct and indirect speech. (8)

Presentation techniques- Tips, Dos and don'ts of presentation, notice and placard presentations. (3)

Written skills: Proposal, writing formats, report writing business letters, applications, covering letters, curriculum vitae designing, summary writing. (7)

Listening- Phonetics and pronunciations (with the help of phonetics dictionary and with tapes from language laboratory). (4)

Etiquettes and grooming. (2)

Group discussion and extempore communication. (4)

Interviews- Tips and model interviews (video shooting and display). (2)

Tutorial: 1h/week

English grammar- Parts of speech, articles, preposition, tenses, active and passive speech, direct and indirect speech. (8)

Presentation techniques- Tips, Dos and don'ts of presentation, notice and placard presentations. (3)

Written skills: Proposal, writing formats, report writing business letters, applications, covering letters, curriculum vitae designing, summary writing. (7)

Books Recommended:

1. Wren and Martin, English Grammar.
2. Tapes from language laboratory, Hyderabad.

Course Code	Course	L	T	Credits
PHSC 112	Computer Applications	2	0	2
		Hours Per Week		

Computer Applications

Theory: 2 h/week

Elements of Computer System: Development of Computers through generation, classification and applications. Basic Schematic Diagram of Digital Computer, Functions of its various components (I/P, O/P, CPU, ALU, Memory), Types of memory, concept of RAM, ROM and Virtual memory. Problem solving, algorithm, flowchart, SDLC, data structure, list, stack, queue, DBMS.

Concept of System Software: Evolution of operating system, type and need of Translators, Compare MS-DOS vs. UNIX, Elements of LINUX, Internal and External commands of MS-DOS. Advantages, limitation and features of various Windows versions like Windows95/98/2000/XP/2003.

Application Software & packages: MS Office 2003: Features, advantages and limitations of its tools.

Word Processing (MS Word): Basic operation and tools of MS Word with special emphasis to Webpage conversion, mail merge.

Spreadsheet (MS Excel): Elementary functions and tools of MS Excel with special emphasis using statistical and analytical parameters.

Presentation (MS Power point): Slide preparation, insertion of template, file, tables, picture, chart, movies, sound animation and other special effects.

Computer Programming Languages: Features & Comparison of various types of computer languages - machine/low level languages, high level, and assembly languages.

Understanding 'C' Languages: Features of C, data types, Character Set, Tokens, expressions, operations, Simple programs using; getchar and putchar, exposure to scanf and printf, conditional statements (if else, switch and break statements), loops (for, while, do while, continue statement), arrays, functions, Strings etc.

Internet & Computer Applications: Introduction to Computer Networks, Internet (browsing, www, URL, HTTP, FTP, IP Address, E-Mail. Webpage designing). Computer applications in Pharmaceutical and clinical studies, Uses of networking in Pharmaceutical Industries.

Books Recommended:

1. "Computers Today" by Senders D. H., McGrawHill.
2. "Computer fundamentals" by P. K. Sinha. Third edition, BPB Publication.
3. "Information technology", Jaiswal, S., Galgotia Pub.
4. Manuals for MS DOS, MS Office, MS Windows, UNIX.
5. "Office 2000/2003 Complete", BPB Publication.
6. "Internet basic reference A to Z", by Falk B., BPB, Delhi
7. "Operating Systems" by Stallings, PHI.
8. "Computers in Pharmacy" by Thakur P.S., Manchanda R. Nand P; Birla Pub. Pvt Ltd.
9. "Programming in ANSI-C by E. Balaguruswamy –Tata Mc. Graw Hill.
10. "Computer Networks" by Tenenbaum A.S., Prentice Hall of India.
11. "Programming with C" by Byron Gottfield.

Course Code	Course	L	T	Credits
PHSC 113	Pharmaceutical Chemistry I (Inorganic Chemistry)	4	0	4
		Hours Per Week		

Pharmaceutical Chemistry I (Inorganic Chemistry)

Theory: 4h/week:

Diagnostic drugs

Pharmaceutical necessities -preservatives

Complexation and chelation -application in pharmacy

Sources of impurities and their control, limit test for iron, arsenic, lead, heavy metals, chloride and sulphate.

An outline of methods of preparation, uses, sources of impurities, tests of purity and identification and special tests, if any, of the following classes of inorganic pharmaceuticals included in IP 96.

Gases and vapours –inhalants(oxygen), anaesthetics(nitrous oxide)

Topical agents-protective (calamine, titanium dioxide, talc, kaolin), astringent (zinc oxide, zinc sulphate) and anti-infective (boric acid, H₂O₂, iodine, povidone iodine, potassium permanganate, silver nitrate.)

Pharmaceutical aids and necessities

- Acids and bases-acid base theory ,specification of acidity and basicity, official inorganic acid(boric acid HCl, HNO₃, H₃PO₄), nonofficial inorganic acids(H₂SO₄), official inorganic bases(strong ammonia solution, calcium hydroxide, KOH, Na₂CO₃,NaOH,soda lime)
- Buffers-theory and mechanism, pharmaceutical buffer selection, pharmaceutical buffer system
- Antioxidant-theory, the selection of antioxidants, official antioxidants (hypophosphorous acid, sodium bisulphite, sodium thiosulphate, sodium nitrite, nitrogen)
- Pharmaceutical accepted glass-chemistry of glass, types of test employed for glass.
- Waters: official water (water, purified water, water for injection, bacteriostatic water for injection, sterile water for injection)

Nuclear chemistry-nuclear composition ,forces and stability, isotope ,radioactive emission, measurement of radioactivity, modes of decay, half life period, artificial radioactivity, application in pharmacy.

Radiopharmaceuticals and contrast media- Radiopharmaceuticals, Radiopharmaceuticals preparation and radio opaque contrast media.

Co-ordination compounds and complexation-theoretical consideration and official products(calcium diacetate edetate, disodium edetate, dimercaprol, and penicillamine)

Books Recommended:

1. Block, J.H., Roche, E., Soine, T. and Wilson, C., "Inorganic, Medicinal and Pharmaceutical Chemistry", Lea and Febiger.
2. Discher, C.A. et al., Modern inorganic pharmaceutical chemistry, Waveland press.
3. Pharmacopoeia of India, 1996
4. Atherden, L.M., Bentley and Drivers "Text book of Pharmaceutical Chemistry" Oxford University press, London.

Course Code	Course	L	T	Credits
PHSC 114	Pharmaceutical Chemistry-II (Organic Chemistry)	4	0	4
		Hours Per Week		

Pharmaceutical Chemistry-II (Organic Chemistry)

Theory: 4h/week

Organic chemistry-the structural theory, chemical bond, quantum mechanics, atomic orbitals, electronic configuration, molecular orbitals, intramolecular forces, bond dissociation energy, polarity of bonds, polarity of molecules, atomic structure, hybridization, sigma and pi bond, covalent, electrovalent and co-ordinate bond, inductive effect, resonance effect, tautomerism, conjugation, hyperconjugation, type of bond fission.

Relations of structure with properties like density, melting point, boiling point, solubility, etc.

Structure, nomenclature, preparation and reaction of- Alkane, alkene, alkyne, cycloalkane and dienes, Alkyl halides, alcohols, ethers, carboxylic acids and their functional derivatives, aldehydes and ketones, amines, dicarboxylic acids, malonic acid ester and its importance, acetoacetic acid ester and its importance, Saytzeff's rule, peroxide effect, Ozonolysis, Bayer's strain theory, Coulson and Moffitt's modification, addition reactions of conjugated dienes.

Stereo chemistry-optical activity optical isomer, geometrical isomers, racemic modification, meso structure, enantiomer, configuration, chiral centre, reaction involving stereoisomers, stereoselective and stereospecific reactions.

Role of solvent-secondary bonding, solubility of non-ionic and ionic solutes, protic, and aprotic solvents, ion pairs, role of solvent in substitution reaction, phase transfer catalysis.

Books Recommended:

1. Morrison, B.T., and Boyd, R.N., "Organic Chemistry", Prentics Hall of India Pvt. Ltd., New Delhi.
2. Vogel A.I., "Textbook of Practical Organic chemistry", ELBS/Longman.
3. Mann, F.G. and Saunders, B.C., "Practical Organic Chemistry", ELBS/Longman
4. Finar, I.L. Organic Chemistry, Vol.-I and II, ELBS/Longman
5. Hendrikson, Organic Chemistry.

Course Code	Course	L	T	Credits
PHSC 115	Introduction to Pharmaceutics	4	0	4
		Hours Per Week		

Introduction to Pharmaceutics

Theory: 4h/week

History of Pharmacy and background of Pharmacy profession

Development of Pharmacopoeia and National formulary

Code of ethics for Pharmacist

Pharmaceutical calculations and posology: Pharmaceutical calculations, significant figures, different systems of weights and measures; calculation of dosages for children; reducing and enlarging of formulae;; percentage solutions; allegation; proof spirit; thermometry; isotonic solutions; electrolyte solutions; displacement value

Classification of dosages forms. Routes of administration

A. Pharmaceutical additives: Source, chemical profile, application and interaction

B. Formulation considerations of aromatic waters, solutions, syrups, elixirs, infusions, decoctions, tinctures, spirits, extracts, jellies, mucilage, lotion and liniments, collodions, douches, gargles, enemas, eye drops, ear drops and nasal drops

Size Reduction: Mechanism of size reduction, factors influencing size reduction, pharmaceutical applications, energy requirements, roller mill, and edge runner mill, ball mill, hammer mill, fluid energy mill, colloid mill, closed circuit grinding.

Size Separation: Standard screens, oscillating tray sifter, grating sifters, cyclone separators. Sedimentation, elutriation.

Filtration and clarification: Filtration, Mechanism of filtration, factors affecting filter selection, Kozney's equation, filter media, filter aids, Classification of filters - filter press, leaf filters, rotary continuous filters, metafilters, membrane filters.

Extraction: Leaching process, factors affecting the efficiency of leaching process; diffusion batteries, continuous diffusion batteries, Dorr agitator, continuous counter current extraction, Cragg's apparatus.

Books Recommended:

1. Ansel: Introduction to Pharmaceutical Dosages Forms
2. Remington's Pharmaceutical Sciences.
3. Indian Pharmacopoeia.
4. British Pharmacopoeia.
5. Jain & Sharma: The theory and practice of Professional Pharmacy
6. Jain : Pharmaceutical Arithmetic.
7. An introduction to Chemical Engineering - Badger and Banchero.
8. Chemical Engineering - Richardson and Coulson.
9. Introduction to Unit Operation - McCabe and Smith.
10. Theory and Practice of Industrial Pharmacy-Lachman,Lieberman and Kanig
11. Bentley's Text Book of Pharmaceutics - Rowlin.

Course Code	Course	L	T	Credits
PHSC 116	Remedial Mathematics	2	2	4
		Hours Per Week		

Remedial Mathematics

Theory: 2h/week

Algebra: Laws of indices, Surds, pure and mixed Surds, Rationalization of surds, Equivalent fraction with a rational denominator of a surd, Square root, Cube root of surds. Modulus and arguments of a complex number, square root of a complex number. Solution of quadratic equations, theory of quadratic equations, solution of simultaneous equations and miscellaneous equations. Logarithms, Properties of logarithms, Arithmetical Geometrical and Harmonical progressions, permutation and combination. Binomial theorem with positive index. Matrices, types of matrices, addition, subtraction, multiplication and transpose of matrices, adjoint and inverse of a matrix. Application of matrices in solving equations. Determinants and their properties, applications of determinants in the solution of linear equation.

Co-ordinate Geometry: Distance formula, area of a triangle and quadrilateral, Equations of a straight line, angle between straight lines, point o intersection of two straight lines, perpendicular distance of a point from the straight lines, Second degree equation representing two lines, Equation of circle.

Tutorials: 2h/week

Trigonometry: Measurement of angles relation between trigonometric ratio of an angle of a right angle triangle, complementary and supplementary angle, multiple and submultiple angles, product formulae sum and difference formulae of trigonometric ratios, identities of trigonometric ratios, relation between sides and angles of any triangle, area of a triangle, radius of circumscribed, inscribed circles.

Calculus: Limit of a function, limit at infinity, Differentiation of some function, product rule, quotient rule of differentiation, differentiation of inverse trigonometric function, implicit function, logarithmic form, parametric form, successive differentiation, tangent and normal, maxima and minima.

Integration as inverse of differentiation, simple integration formulae, integration by substitution and by parts.

Books Recommended:

1. Algebra by Hall and Knight
2. Coordinate geometry by S. L. Loney.
3. Trigonometry by S. L. Loney.
4. Differential Calculus by Gorakh Prasad.
5. Integral Calculus by Gorakh Prasad.

Course Code	Course	L	T	Credits
PHSC 117	Remedial Biology	4	0	4
		Hours Per Week		

Remedial Biology

Theory: 4h/week

Origin and evolution of life: an outline.

Classification and general treatment of Plant Kingdom.

Study of the following families of medicinal and aromatic plants- Apocynaceae, Solanaceae, Labiatae, Papaveraceae, Umbelliferae, Leguminosae, Rubiaceae, Liliaceae and Scrofulariceae.

Physiology of plants- photosynthesis, respiration and transpiration.

Morphology, histology and structural organization of root, stem, bark, wood, leaf, flower, fruit and seed.

Structure of plant cell, cell organelles, types of plant tissues and their functions.

Fundamental laws of inheritance- Mendel's law. Life cycle of a common angiosperm plant.

Classification and general treatment of animal kingdom.

Study of structure and life cycle of amoeba, plasmodium and diseases caused by systemic helminths and parasites.

General treatment of digestive, circulatory system and reproductive cycles of amphibian and mammals.

Course Code	Course	P	Credits
PHSC 118	Computer Applications	3	1
		Hours per week	

Computer Applications

Practicals: 3 h/week

- Solving a problem using Algorithm, Flowchart and SDLC.
- Study of Operating System; Windows and MS DOS commands
- WebPage designing in MS Front Page
- Prepare a document using MS Word.
- Prepare a Spreadsheet/worksheet using MS Excel.
- Prepare a presentation using MS Power point.
- Simple Programme in 'C' language.

Books Recommended:

1. "Computers Today" by Senders D. H., McGrawHill.
2. "Computer fundamentals" by P. K. Sinha. Third edition, BPB Publication.
3. "Information technology", Jaiswal, S., Galgotia Pub.
4. Manuals for MS DOS, MS Office, MS Windows, UNIX.
5. "Office 2000/2003 Complete", BPB Publication.
6. "Internet basic reference A to Z", by Falk B., BPB, Delhi
7. "Operating Systems" by Stallings, PHI.
8. "Computers in Pharmacy" by Thakur P.S., Manchanda R.Nand P; Birla Pub.Pvt Ltd.
9. "Programming in ANSI-C by E. Balaguruswamy –Tata Mc. Graw Hill.
10. "Computer Networks" by Tenenbaum A.S., Prentice Hall of India.
11. "Programming with C" by Byron Gottfield.

Course Code	Course	P	Credits
PHSC 119	Pharmaceutical Chemistry- I (Inorganic Chemistry)	3	1
		Hours per week	

Pharmaceutical Chemistry I (Inorganic Chemistry)

Practicals: 3h/week

Preparation of inorganic medicinal and pharmaceutical compounds.

Limit test of Chloride, Sulphate, Iron, Lead, Arsenic in the given sample.

Detection of inorganic salts including interfering radicals

Books Recommended:

1. Block, J.H., Roche, E., Soine, T. and Wilson, C., "Inorganic, Medicinal and Pharmaceutical Chemistry", Lea and Febiger.
2. Discher, C.A. et al., Modern inorganic pharmaceutical chemistry, Waveland press.
3. Pharmacopoeia of India, 1996
4. Atherden, L.M., Bentley and Drivers "Text book of Pharmaceutical Chemistry" Oxford University press, London

Course Code	Course	P	Credits
PHSC 1110	Pharmaceutical Chemistry-II (Organic Chemistry)	3	1
		Hours per week	

Pharmaceutical Chemistry-II (Organic Chemistry)

Practicals: 3h/week

Identification of elements and organic compounds in the given sample.

Synthesis of compounds involving acetylation, benzylation, bromination, reduction, diazotisation and oxidation.

Books Recommended:

1. Morrison, B.T., and Boyd, R.N., "Organic Chemistry", Prentice Hall of India Pvt. Ltd., New Delhi.
2. Vogel A.I., "Textbook of Practical Organic chemistry", ELBS/Longman.
3. Mann, F.G. and Saunders, B.C., "Practical Organic Chemistry", ELBS/Longman
4. Finar, I.L. Organic Chemistry, Vol.-I and II, ELBS/Longman
5. Hendrikson, Organic Chemistry.

Course Code	Course	P	Credits
PHSC 1111	Introduction to Pharmaceutics	3	1
		Hours per week	

Introduction to Pharmaceutics

Practicals: 3h/week

Experiments based on theory i.e., Preparation of Waters, Solutions, Syrups, Elixirs, Infusions, Decoctions, Spirits, Jellies, Mucilages, Lotions, Liniments, Gargles, Enemas, Eye, Ear & Nasal Drops, Practice in Pharmaceutical Calculations. Experiments based on Size Reduction, Size Separation, Filtration, Extraction.

Books Recommended:

1. Ansel: Introduction to Pharmaceutical Dosages Forms
2. Remington's Pharmaceutical Sciences.
3. Indian Pharmacopeia.
4. British Pharmacopeia.
5. Jain & Sharma: The theory and practice of Professional Pharmacy
6. Jain : Pharmaceutical Arithmetic.
7. An introduction to Chemical Engineering - Badger and Banchero.
8. Chemical Engineering - Richardson and Coulson.
9. Introduction to Unit Operation - McCabe and Smith.
10. Theory and Practice of Industrial Pharmacy-Lachman,Lieberman and Kanig
11. Bentley's Text Book of Pharmaceutics - Rowlin.

Course Code	Course	P	Credits
PHSC 1112	Remedial Biology	3	1
		Hours per week	

Remedial Biology

Practical: 3h/week

Morphology of different plant parts.

Microscopy: Type of microscopes, staining procedures, use of microscope in the identification of different plant and animal part.

Gross identification of slides for structure and life cycle of lower plants and animals mentioned in theory

B.PHARM. – II SEMESTER

Course Code	Course	L	T	Credits
PHSC 211	APPLIED MATHEMATICS AND BIOSTATISTICS	4	0	4
		Hours Per Week		

Applied Mathematics and Biostatistics

Theory: 4h/week

DIFFERENTIAL EQUATIONS: Definition and formation of differential equations, differential equations of first order and first degree in which variables are separable, homogeneous, reducible to homogeneous equations, linear equation form or equation reducible to linear equation form. Linear differential equations with constant coefficients: Auxiliary equations having different roots, equal roots, imaginary roots. Particular integrals

LAPLACE TRANSFORMS: Definition, transforms of elementary functions, properties of linearity and shifting, Inverse laplace transforms, transforms of derivatives, solution of ordinary and simultaneous differential equations.

STATISTICS: No derivation of formula (application part), condensation of data collected, various forms of frequency distribution, tabular presentation of data, structure of a table, simple table, complex table. Bar diagram, graphical representation of frequency distribution, histogram, frequency polygon, cumulative frequency curve, some common types of frequency distribution. Measure of central tendency : Calculation of arithmetic mean, geometric mean, median, quartiles and mode. Measure of dispersion : Range, quartile deviation, mean deviation, standard deviation, coefficient of variation. Fitting of curves using least square principle. Interpolation : Graphical method, curve fitting, **Newton's** Gregory method, Newton-Binomial method, Lagranges method. Probability : Simple and compound events, mutually exclusive events, independent events. Additive and multiplicative law of probability, use of binomial theorem, characteristics of binomial distribution, fitting of binomial distribution and testing of goodness of fit. Normal distribution, characteristics of normal distribution, fitting chi-square distribution – application of chi-square test of goodness of fit. Comparison of a number of frequency distribution, finding association and relationship between attributes. Calculation of coefficient of correlation (Karl Pearson's formula), rank correlation coefficient, calculation of regression coefficient, regression lines, test of significance of large samples. Significance test of sample mean, comparison of large samples. Significance test for proportions. Significance test of difference between means of two samples – samples from same population (Universe), sample from different population. Fiducial limits for unknown mean. Test of significance of small samples : t-distribution, use of t-distribution to test the significance of the mean of the sample testing, the significance of the difference between the two sample mean, paired samples when the size of sample same.

Books Recommended:

1. Integral Calculus by Gorakh Prasad, Pothishala Prakashan, Pvt. Ltd, Allahabad.
2. Laplace and Fourier Transforms by Goyal and Gupta, pragati prakashan, Meerut.
3. Fundamental of Mathematical statistics by ray and Sharma.
4. Fundamental of Mathematical statistics by Gupta and Kapoor.

Course Code	Course	L	T	Credits
PHSC 212	HUMAN ANATOMY, PHYSIOLOGY AND HEALTH EDUCATION-I	4	0	4
		Hours Per Week		

Human Anatomy, Physiology And Health Education -I (Theory)

Theory: 04 Hours/week:

Scope of anatomy and physiology and basic terminology used in these subjects, Structure of cell, its components and their functions:

Elementary Tissues of the Human Body: Epithelial, connective, muscular and nervous tissues; their sub-types and characteristics.

Skeletal Muscles: Their gross anatomy, physiology of muscle contraction, physiological properties of skeletal muscle and their disorders.

Haemopoietic System: Composition and functions of blood and its elements, their disorders, blood groups and their significance, mechanism of coagulation, disorders of platelets and coagulation.

Lymph and Lymphatic System: Composition, formation and circulation of lymph; disorders of lymph and lymphatic system. Basic physiology and functions of spleen.

Cardiovascular System: Basic anatomy of heart, physiology of heart, blood vessels and circulation. Basic understanding of cardiac cycle, heart sounds and electrocardiogram. Blood pressure and its regulation. Brief outline of cardiovascular disorders like; hypertension, hypotension, arteriosclerosis, angina, myocardial infarction, congestive heart failure and cardiac arrhythmias.

Health Education:

Concepts of health and diseases, disease agents and prevention of diseases.

Classification of food requirements balanced diet, nutritional deficiency disorders, their treatments and prevention.

Demography and family planning: Demography cycle, family planning, various contraceptive methods. Medical termination of pregnancy.

First Aid: Emergency treatment of shock, snake bites, burns, poisoning, fractures and resuscitation methods.

Course Code	Course	L	T	Credits
PHSC 213	Pharmaceutical Engineering	4	0	4
		Hours Per Week		

Pharmaceutical Engineering

Theory: 4h/week:

Introduction, elements of industrial stoichiometry

Flow of fluids: Manometers, mechanism of fluid flow, Bernoulli's theorem, friction losses, enlargement and contraction losses, measurement of flow of fluids.

Transportation of fluids: Pipe joints, pipe fittings, pumps, transportation of gases, ejectors, compressors, blowers.

Flow of heat: Classification of heat flow processes, compound resistances in series, flow through cylinder, conduction through fluids. Overall coefficients, fluids in turbulent flow in clean pipes forced and natural convection, condensing vapours. Radiation, rate of radiation, heat transfer by radiation and convection. Tubular heaters, heat interchangers, inductive heating.

Evaporation: Types of evaporators, jacketed kettles, tube evaporators, forced circulation evaporators and evaporator accessories. Evaporator capacity-heat and material balances, multiple effect evaporation, capacity of multiple effect evaporators.

Distillation: Theory of distillation of mixtures (a) binary mixtures of miscible liquids, (b) binary mixtures of immiscible liquids, (c) Rectification, rectifying columns, fractionating column and simple calculations. McCabe Thiele method for calculation of theoretical plates, Plate efficiency. Industrial equipments for vacuum, steam, reflux and molecular distillation.

Drying: Classification of dryers, compartment, tunnel, rotary, cylindrical, vacuum, spray and fluidized bed dryers. Theory of drying, loss on drying and moisture content, equilibrium moisture content. Principles of freeze drying, freeze dryers.

Safety Measures: Safety methods in pharmaceutical laboratories and works, mechanical, chemical, electrical and fire hazards including inflammable gases and dusts.

Centrifugation: Centrifuges, Theoretical consideration, laboratory equipments, large scale equipments, low temperature centrifuge for biological work.

Conveying: Types of conveyers, belt conveyers, chain conveyers, screw conveyers, pneumatic conveyers. Conveyance of manufactured materials

Books Recommended:

1. An introduction to Chemical Engineering - Badger and Banchero.
2. Chemical Engineering - Richardson and Coulson.
3. Introduction to Unit Operation - McCabe and Smith.
4. Theory and Practice of Industrial Pharmacy-Lachman,Lieberman and Kanig
5. Bentley's Text Book of Pharmaceutics - Rowlin.

Course Code	Course	L	T	Credits
PHSC 214	Pharmaceutical Chemistry-III (Organic Chemistry-II)	3	0	3
		Hours Per Week		

Pharm. Chem.-III (Organic Chem.-II)

Theory: 4h/week:

Benzene Kekule structure, heat of hydrogenation and stability, C-C bond length in benzene, orbital picture, aromatic character, Huckel's rule, mechanism of electrophilic and nucleophilic aromatic substitution, theory of effect of substituent on reactivity and orientation.

- Miscellaneous methods: diazotisation, Kjeldahl's method of nitrogen estimation, Oxygen flask combustion, gasometry, analysis of oils, fats and waxes.
- The following topics should cover method of preparation, properties with special emphasis wherever known
 - ✓ Relation of structures and properties like density, b.p., m.p., solubility etc.
 - ✓ Arenes and its derivatives
 - ✓ Phenols
 - ✓ Aryl halides
 - ✓ Sulphonic acids
 - ✓ Poly nuclear aromatic hydrocarbons, naphthalene, phenanthrenes
 - ✓ Heterocyclic compounds nomenclature, properties and reactions of pyridine, pyrrole and furan.
 - ✓ Polymers and polymerization-Copolymerization, ionic polymerization, coordination polymerization.

Course Code	Course	L	T	Credits
PHSC 215	Pharmacognosy and Phytochemistry-I	4	0	4
		Hours Per Week		

Pharmacognosy and Phytochemistry – I

Theory: 4 Hours/Week:

Definition, historical background, present status and future scope of Pharmacognosy, Definition of selected Botanical terms and nomenclature used in Pharmacognosy.

Plant cell: cell organelles, their morphology and functions, Cell differentiation .

Introduction to Biosynthetic pathways and biomolecules.

Sources of Drugs: Terrestrial, marine and microbes as source of medicine. Introduction to families such as Apocynaceae, Compositae, Convolvulaceae, Gramineae, Labiatae, Leguminosae, Pinaceae, Zingiberaceae, Liliaceae, Solanaceae etc. as source of important phytopharmaceuticals.

Classification of crude drugs: Alphabetical, Morphological, Taxonomical, Pharmacological, Chemical and Biogenetic classifications. Organized and unorganized drugs.

General Treatment with regard to occurrence, distribution, classification, chemistry and analysis of carbohydrates, lipids and proteins.

Detailed study on unorganized drugs with source, collection, preparation, storage, diagnostic characters, constituents, chemical tests, substitutes, adulterants and uses of the following:

Carbohydrate and related drugs: Agar, Isabgol, Starch, Honey, Bael, Pectin, Cellulose and Cellulose derivatives, Alginates , Gum Acacia, Gum Tragacanth and other gums and mucilages of pharmaceutical importance.

Lipids and other constituents of following: Castor , Sesame, Olive, Almond, corn Cotton seed, Linseed, Neem, Chaulmoogra , Fish products, Theobroma, Lard, Lanolin, Beeswax and Spermaceti.

Proteins and protein products:

Study of following miscellaneous substances: Surgical fibers, Inorganic Pharmaceutical aids: Talc, Kaolin, Bentonite, shilajit and common edible salts.

Books Recommended:

1. Text Book of Pharmacognosy – C.S. Shah & J. S. Quadry
2. Text Book of Pharmacognosy – T. E. Wallis
3. Pharmacognosy – Trease & Evans
4. Pharmacognosy – Brady & Taylor
5. Text Book of Pharmacognosy – V. K. Kapoor & S.S. Handa
6. Pharmacognosy – C. K. Kokate, A.P. Purohit and S.B. Gokhale

Course Code	Course	P	Credits
PHSC 216	Human Anatomy, Physiology And Health Education -I	3	1
		Hours per week	

Human Anatomy, Physiology And Health Education -I

Practicals: 3 Hours/Week

Study of human skeleton

Study of different systems with the help of charts and models.

Microscopic study of different tissues.

Estimation of hemoglobin in blood, Determination of bleeding time, clotting time, R.B.C., D.L.C.and E.S.R.

Recording of body temperature, pulse rate and blood pressure, basic understanding of electrocardiogram PQRST waves and their significance.

Course Code	Course	P	Credits
PHSC 217	Pharmaceutical Engineering	3	1
		Hours per week	

Pharmaceutical Engineering

Practical: 3 hrs/week:

Experiments based on flow of fluids

Experiments based on flow of heat

Experiments based on distillation

Experiments based on drying

Experiments based on centrifugation

Experiments based on conveying.

Books Recommended:

1. An introduction to Chemical Engineering - Badger and Banchero.
2. Chemical Engineering - Richardson and Coulson.
3. Introduction to Unit Operation - McCabe and Smith.
4. Theory and Practice of Industrial Pharmacy-Lachman,Lieberman and Kanig
5. Bentley's Text Book of Pharmaceutics - Rowlin.

Course Code	Course	P	Credits
PHSC 218	Pharmaceutical Chemistry-III (Organic Chemistry)	3	1
		Hours per week	

Pharmaceutical Chemistry-III (Organic Chemistry)

Practicals: 3 Hours/week:

Synthesis, Purification, Characterisation (by using solubility, melting point, and percentage purity) of organic compounds based on the theory like 2,4,6-trinitrophenol from phenol, Iodoform from ethyl alcohol, Phthalidimide from phthalic anhydride, Aspirin, Phenyl urea, Flourescein, Methyl orange etc..

Books Recommended:

1. Morrison, B.T., and Boyd, R.N., "Organic Chemistry", Prentics Hall of India Pvt. Ltd., New Delhi.
2. Vogel A.I., "Textbook of Practical Organic chemistry", ELBS/Longman.
3. Mann, F.G. and Saunders, B.C., "Practical Organic Chemistry", ELBS/Longman
4. Finar, I.L. Organic Chemistry, Vol.-I and II, ELBS/Longman
5. Hendrikson, Organic Chemistry.

Course Code	Course	P	Credits
PHSC 219	Pharmacognosy and Phytochemistry – I	3	1
		Hours per week	

Pharmacognosy and Phytochemistry – I

Practicals: 3 Hours/week:

Studies on drugs of different morphology.

Experiments including techniques in microscopy covering section cutting, use of clearing agents, Staining agents, mountants etc.

Use, care and focusing practices of microscope, microscopic examination of tissues and cells of herbal drugs in section and powder form.

Histological examination and Tissue system study of at least one representative drug of each category e.g. leaf, bark, root, rhizome, stem, fruit and seed.

Experiments on study of microscopic diagnostic characters in drugs belonging to various morphological parts with reference to trichomes, epidermal cells, stomata, palisade, Sclerides, Vascular bundles, Secretory glands, Starch grains and Calcium oxalate crystals.

Extraction of Carbohydrates, lipids and proteins.

Phyto-chemical study of unorganized drugs with reference to Chemical tests, Saponification Value, Acid value, Iodine value, Viscosity, Congealing points, Swelling capacity.

Study of Museum drugs.

Visit to Medicinal Plant Garden and preparation of report of the same.

Preparation of Herbarium sheet of at least one medicinal plant.

Books Recommended:

7. Text Book of Pharmacognosy – C.S. Shah & J. S. Quadry
8. Text Book of Pharmacognosy – T. E. Wallis
9. Pharmacognosy – Trease & Evans
10. Pharmacognosy – Brady & Taylor
11. Text Book of Pharmacognosy – V. K. Kapoor & S.S. Handa
12. Pharmacognosy – C. K. Kokate, A.P. Purohit and S.B. Gokhale