Syllabus of SBSPET-2026 for Pharmaceutical Sciences

A. Research Methodology Syllabus for SBS-PET 2026

Unit 1: Research Aptitude

Research: Meaning, types, and characteristics, positivism and post-positivistic approach to research
Methods of research: Experimental, descriptive, historical, qualitative and quantitative methods
Steps of research
Thesis and article writing: Format and styles of referencing
Application of ICT in research
Research ethics

Unit 2: Data Interpretation

Sources, acquisition and classification of data
Quantitative and qualitative data
Graphical representation (bar-chart, histograms, pie-chart, table-chart and line-chart) and mapping of data
Data interpretation
Data and governance

Unit 3: Biostatistics

Definition, application, sample size, importance of sample size, factors influencing sample size, dropouts,
Statistical tests of significance, type of significance tests, parametric tests (students "t" test, ANOVA
Correlation coefficient, regression)
Non-parametric tests (Wilcoxon rank tests, analysis of variance, correlation, chi square test), null hypothesis, P values, degree of freedom, interpretation of P values.

Unit 4: Internet and Communication Technology

ICT: General abbreviations and terminology
Basics of Internet, Intranet, E-mail, Audio and Video-conferencing
Digital initiatives in higher education
ICT and Governance

B. **Pharmaceutical Sciences**

UNIT I: Medicinal Chemistry and Computer Aided Drug Design (CADD)

Basic principles of medicinal chemistry including physicochemical properties, stereochemistry, bioisosterism, drug–receptor interactions, transduction mechanisms, and concept of prodrugs. Study of mechanism of action, therapeutic uses, synthesis, and structure activity relationship (SAR) of important classes of drugs including cholinergic and anticholinergic agents, CNS drugs, cardiovascular drugs, analgesics, diuretics, antibioticsand anticancer agents.

Brief introduction to Computer Aided Drug Design (CADD) including physicochemical parameters, QSAR, molecular docking, pharmacophore modeling, virtual screening, fragment-based drug design, homology modeling, and applications of computational tools in modern drug discovery.

UNIT II: Instrumental Analysis and Separation Techniques

Principles, instrumentation, applications, and interpretation of UV-Visible spectroscopy, IR spectroscopy, Mass spectroscopy, and NMR spectroscopy. Basic concepts of chromatographic and separation techniques including TLC, HPTLC, column chromatography, HPLC, GC, LC-MS, GC-MS, extraction methods, method development, and applications in natural product research and pharmaceutical analysis.

UNIT III: Pharmaceutics

Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances, drug-excipient compatibility studies,methods of determination, Stability protocols, reports and ICH guidelines. Factors influencing absorption, distribution, metabolism and excretion of drugs, design, formulation &evaluation of controlled release oral Drug Delivery Systems (DDS), Mucoadhesive DDS, gastroretentive, pulmonary, transdermal DDS, Ocular delivery systems, Methods in drug targeting, nanoparticulate systems and vesicular systems.

UNIT IV: Fundamentals of Pharmacology and Receptor Pharmacology

Dosage forms and routes of administration, mechanism of action, combined effect of drugs, factors modifying drug action, tolerance and dependence, Pharmacogenetics, Principles of Basic and Clinical pharmacokinetics, Absorption, Distribution, Metabolism and Excretion of drugs, Adverse Drug Reactions, Bioassay of Drugs and Biological Standardization, Discovery and development of new drugs,

Bioavailability and bioequivalence studies. Therapeutic Drug Monitoring, Concept of Essential Drugs and Rational Drug use.

Intercellular and intracellular signaling pathways. Drug receptor interaction theories, Receptor occupation and response relationship, spare receptors, silent receptors, orphan receptors, presynaptic and postsynaptic receptors. Receptor subtypes, Classification of receptor family and molecular structure ligand gated ion channels. G-protein coupled receptors, tyrosine kinase receptors and nuclear receptors. Secondary messengers: cyclic AMP, cyclic GMP, calcium ion, inositol 1,4,5-trisphosphate, (IP3), NO, and diacylglycerol. Detailed study of cyclic AMP signaling pathway, mitogen-activated protein kinase (MAPK) signaling, Janus kinase (JAK)/signal transducer and activator of transcription (STAT) signaling pathway.Receptor down regulation and upregulation, Pharmacodynamic and pharmacokinetic aspects of chiral drugs, allosteric binding and thermodynamics of drug interactions with the receptors. Dose response relationship and different types of antagonisms. Desensitization and tachyphylaxis.

Unit V: Advanced Pharmacognosy and Phytopharmaceutical Technology

Study of natural products including biosynthetic pathways and secondary metabolites; pharmacognosy, phytochemistry, isolation, identification, chemical tests, estimation and standardization of crude drugs containing alkaloids, glycosides, flavonoids, tannins, steroids, terpenoids and resins. Evaluation of crude drugs using microscopy, modern analytical techniques and adulteration detection methods.

Advanced extraction, fractionation and separation techniques including microwave-assisted extraction, HPTLC, preparative HPLC, flash chromatography, CCC and SCFE. Plant tissue culture techniques such as callus, suspension, organ and hairy root culture, micropropagation, protoplast fusion, biotransformation and production of secondary metabolites.

Conventional and novel herbal formulations including tablets, capsules, hydrogels, emulsions, liposomes, nanoparticles and nutraceuticals; regulatory guidelines of WHO, AYUSH, FSSAI and ASU drugs. Herbal cosmetics, physiology of skin, hair, lips and nails, formulations, quality control and toxicity studies.

Biological screening and pharmacological evaluation of herbal drugs through in vitro and in vivo methods for antioxidant, antimicrobial, anti-inflammatory, anticancer and other activities; toxicity and stability studies as per OECD, ICH, WHO, FDA and EMA guidelines.