

Course Outcomes for B.Pharmacy

| B. Pharmacy 2nd Semester | | Mention Bloom Level (L1, L2, L3, L4, L5, L6) |
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| Human Anatomy and Physiology II–Theory (BP201T) :C201 | | |
| After the completion of the course, students will be able to | | |
| Course Code | Course Outcomes | Bloom's Level |
| C201.1 | Illustrate the structure and functions of the nervous system along with electrophysiology and synaptic transmission. | L2 |
| C201.2 | Identify the anatomical structures, digestive processes, nutrient absorption mechanisms and bioenergetic components of the gastrointestinal system, | L3 |
| C201.3 | Differentiate the anatomical structures and physiological mechanisms of the respiratory and renal systems with relevance to pharmacotherapy. | L4 |
| C201.4 | Categorize endocrine glands along with function, mechanisms of action and disorders in a pharmaceutical context. | L4 |
| C201.5 | Explain the anatomy, physiological functions, reproductive processes, and genetic inheritance patterns. | L5 |
| Pharmaceutical Organic Chemistry I – Theory (BP202T) :C202 | | |
| C202.1 | Illustrate the classification, nomenclature and isomerism of organic compounds. | L2 |
| C202.2 | Outline the reaction, properties, orientation and uses of alkanes, alkenes and dienes. | L2 |
| C202.3 | Construct the structure, reactivity, properties, identification and uses of alkyl halides and alcohols. | L3 |
| C202.4 | Analyze the chemistry, properties, identification, structure and uses of aldehydes and ketones. | L4 |
| C202.5 | Explain the reactivity, properties, identification, structure and uses of carboxylic acids and amines. | L5 |
| Biochemistry – Theory (BP203T) :C203 | | |
| C203.1 | Illustrate the significance of carbohydrates, lipids, nucleic acids, proteins and amino acids. | L2 |
| C203.2 | Outline the metabolism of nutrient molecules in physiological and pathological conditions. | L2 |
| C203.3 | Analyze the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs. | L4 |
| C203.4 | Explain the genetic organization of the mammalian genome and functions of DNA in the synthesis of RNAs and proteins. | L5 |
| C203.5 | Identify the causes, manifestations and diagnosis of metabolic disorders. | L3 |

| Pathophysiology – Theory (BP204T) :C204 | | |
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| C204.1 | Illustrate the basic principles of cell injury and inflammation.. | L2 |
| C204.2 | Explain pathophysiology involved in Cardiovascular System, Respiratory system, Renal system diseases. | L2 |
| C204.3 | Differentiate disorders of the blood, endocrine, nervous, and gastrointestinal systems based on their underlying mechanisms. | L4 |
| C204.4 | Interpret etiology, pathogenesis and sign symptoms of diseases associated with bone liver and cancer. | L5 |
| C204.5 | Determine pathophysiology of various infectious diseases. | L5 |
| Computer Applications in Pharmacy – Theory (BP205T) :C205 | | |
| C205.1 | Explain the concept of number systems and basic computer applications in pharmacy. | L2 |
| C205.2 | Utilize databases and computer applications relevant to pharmaceutical data management. | L3 |
| C205.3 | Apply web technologies such as HTML, XML, CSS, programming languages, and web servers for pharmacy drug databases. | L3 |
| C205.4 | Analyze computer-based systems used in pharmacy including laboratory diagnostic, patient monitoring, and pharmaceutical information systems. | L4 |
| C205.5 | Justify the role of bioinformatics and computer-based data analysis in vaccine discovery and preclinical drug development. | L5 |
| Environmental sciences – Theory (BP206T) : C206 | | |
| C206.1 | Explain environmental studies along with natural resources into renewable and non-renewable categories. | L2 |
| C206.2 | Outline causes and impacts of over-exploitation of natural resources with appropriate conservation strategies. | L2 |
| C206.3 | Utilize the natural, renewable and non-renewable resources and the problems associated with them | L3 |
| C206.4 | Examine the concepts of eco system including structure and functions. | L4 |
| C206.5 | Categorize the functions of ecosystems including energy flow and food chains. | L4 |
| Human Anatomy and Physiology II –Practical (BP207P) : C207* | | |
| C207.1 | Demonstrate the coordinated working of organs of various body systems using suitable specimens. | L2 |
| C207.2 | Outline the functions of cranial nerves by various sensory and motor functions. | L2 |
| C207.3 | Perform temperature and body mass index of human body. | L3 |
| C207.4 | Examine and record the tidal volume and vital capacity of the given subject. | L4 |

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| C207.5 | Explain about the family planning devices, pregnancy diagnostic tests, tissues of vital organs and gonads. | L5 |
| Pharmaceutical Organic Chemistry I– Practical (BP208P) :C208* | | |
| C208.1 | Demonstrate the qualitative preliminary test for unknown pharmaceutical organic compounds. | L2 |
| C208.2 | Interpret the presence of several functional groups in pharmaceutical organic compounds. | L2 |
| C208.3 | Prepare organic compounds and their derivatives. | L3 |
| C208.4 | Construct Stereo Models of different compounds. | L3 |
| C208.5 | Analyze unknown pharmaceutical organic compounds by determining their melting point and boiling point. | L4 |
| C208.6 | Conclude and characterize various organic compounds. | L5 |
| Biochemistry – Practical (BP209P) : C209 | | |
| C209.1 | Illustrate the qualitative behaviour of carbohydrates and proteins. | L2 |
| C209.2 | prepare and measure pH of given buffer solution. | L3 |
| C209.3 | identify the amount of reducing sugars by DNSA method and proteins by Biuret method. | L3 |
| C209.4 | examine the constituents present in Urine and their clinical significance. | L4 |
| C209.5 | determine the effect of temperature and substrate concentration on salivary amylase activity. | L5 |
| Computer Applications in Pharmacy – Practical (BP210P) :C210* | | |
| C210.1 | Demonstrate the use of digital tools such as word processing, HTML, and online resources for collecting and presenting disease and drug-related information. | L2 |
| C210.2 | Use online databases and word processing tools to retrieve drug information, create questionnaires, and generate mailing labels. | L3 |
| C210.3 | Analyze patient and drug information by organizing data using tables, queries, and forms in MS Access. | L4 |
| C210.4 | Develop database applications including reports, invoices, and web/XML exports for effective management of healthcare data. | L5 |

| B. Pharmacy 4th Semester | | Mention Bloom Level (L1, L2, L3, L4, L5, L6) |
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| Pharmaceutical Organic Chemistry III– Theory (BP401T) : C401 | | |
| After the completion of the course, students will be able to | | |
| Course Code | Course Outcomes | Bloom's Level |
| C401.1 | Classify the stereochemical reactions in organic molecules | L2 |
| C401.2 | Illustrate the geometrical aspects of organic compounds | L2 |
| C401.3 | Utilize the methods of preparation, reactions and medicinal uses of heterocyclic compounds | L3 |
| C401.4 | Determine the synthetic methods, reactions, uses and mechanism of heterocyclic compounds. | L5 |
| C401.5 | Interpret the mechanism of various synthetic reactions. | L5 |
| Medicinal Chemistry I –Theory (BP402T) : C402 | | |
| C402.1 | Outline the physicochemical properties of drugs and their metabolic pathways | L2 |
| C402.2 | Illustrate the drugs acting on sympathetic nervous system with their mechanism of action, structure, SAR, synthesis and pharmacological uses of drugs | L2 |
| C402.3 | Categorise various drug with medicinal uses, SAR, mechanism of action, and synthesis of drugs acting of Parasympathetic system | L4 |
| C402.4 | Interpret the importance of the drugs acting as antipsychotic and anticonvulsant with their therapeutic value, pharmacological action, synthesis and SAR | L5 |
| C402.5 | Explain the drugs acting as anaesthetics and analgesics with the details about their structure, synthesis, mechanism and SAR | L5 |
| Physical Pharmaceutics II –Theory (BP403T) : C403 | | |
| C403.1 | Outline the classification, properties, and stability of colloidal dispersions in pharmaceutical systems. | L2 |
| C403.2 | Identify the rheological properties and deformation behavior of pharmaceutical systems | L3 |
| C403.3 | Utilize the principles of suspensions and emulsions to study the behaviour of pharmaceutical drugs. | L3 |
| C403.4 | explain the particle size, surface characteristics, and flow properties of powders and their significance in pharmaceutical systems. | L5 |
| C403.5 | interpret the principles of drug stability, including reaction kinetics, degradation factors, and stabilization methods to predict the stability of pharmaceutical products. | L5 |

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| | Pharmacology I – Theory (BP404T) : C404 | |
| C404.1 | identify the pharmacological actions of different categories of drugs. | L3 |
| C404.2 | explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels. | L2 |
| C404.3 | apply the basic pharmacology in the prevention and treatment of various diseases. | L3 |
| C404.4 | analyze the effect of drugs on animals by simulated experiments. | L4 |
| C404.5 | identify correlation of pharmacology with other bio medical sciences. | L3 |
| C404.6 | determine the pharmacology of psychopharmacological agents. | L5 |
| | Pharmacognosy and Phytochemistry I– Theory (BP405T) : C405 | |
| C405.1 | Explain sources, classification, adulteration, and evaluation of crude drugs. | L2 |
| C405.2 | Interpret cultivation, collection, processing, storage, and conservation methods of medicinal plants | L2 |
| C405.3 | Construct plant tissue culture techniques and their applications in Pharmacognosy. | L3 |
| C405.4 | Identify the role of Pharmacognosy in traditional systems and classify secondary metabolites. | L3 |
| C405.5 | Interpret sources, chemistry, and uses of primary metabolites and natural products. | L5 |
| | Medicinal Chemistry I –Practical (BP406P) : C406 | |
| C406.1 | Illustrate the synthesis of various medicinal compounds and their intermediates | L2 |
| C406.2 | Determine the purity of pharmaceutical substances by performing appropriate assay methods | L5 |
| C406.3 | Estimate the partition coefficient of drugs using suitable methods | L5 |
| C406.4 | Analyze the physicochemical properties for given drugs using computational tools | L4 |
| | Physical Pharmaceutics II – Practical (BP407P) : C407 | |
| C407.1 | Choose an appropriate method to determine particle size and particle size distribution. | L1 |
| C407.2 | Make use of derived and flow properties of powders for stable solid formulation. | L3 |
| C407.3 | Determine the viscosity using Ostwald’s and Brookfield’s viscometer. | L5 |

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| C407.4 | Select a good suspending agent for the preparation of a stable suspension. | L3 |
| C407.5 | Analyze the rate constants of chemical reactions and the shelf life of pharmaceutical formulations . | L4 |
| Pharmacology-I – Practical (BP408P) : C408 | | |
| C408.1 | Explain basic concepts of experimental pharmacology, laboratory instruments, animals, and CPCSEA guidelines. | L2 |
| C408.2 | Demonstrate basic laboratory techniques and routes of drug administration in experimental animals. | L3 |
| C408.3 | Perform experiments to study pharmacological effects of drugs using suitable animal models. | L3 |
| C408.4 | Analyze drug effects using experimental models such as actophotometer, MES, PTZ, and behavioral tests. | L4 |
| C408.5 | Interpret experimental results of pharmacological studies including local anesthetic and CNS drug effects. | L5 |
| Pharmacognosy and Phytochemistry I – Practical (BP409P) : C409* | | |
| C409.1 | Summarize the different chemical tests employed in crude drug evaluation. | L2 |
| C409.2 | Apply quantitative microscopy parameters of crude drugs. | L3 |
| C409.3 | Analyze microscopic features using micrometry and lycopodium method. | L4 |
| C409.4 | Categorize physicochemical parameters based on their function in crude drug standardization. | L4 |
| C409.5 | Assess the significance of swelling and foaming index in the quality control of natural drugs. | L5 |

| B. Pharmacy 6th Semester | | Mention Bloom Level (L1, L2, L3, L4, L5, L6) |
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| Medicinal Chemistry III – Theory (BP601T) : C601 | | |
| After the completion of the course, students will be able to | | |
| Course Code | Course Outcomes | Bloom's Level |
| C601.1 | Illustrate Historical background, Nomenclature, Stereochemistry, SAR of β -lactam, aminoglycoside and tetracycline antibiotics | L2 |
| C601.2 | Outline stereochemistry, structure–activity relationship (SAR), chemical degradation pathways, and the etiology of infectious diseases along with the basic concepts of prodrug design | L2 |
| C601.3 | Categorised anti-tubercular, antiviral and quinolone drugs | L4 |
| C601.4 | explain and compare antifungal, antiprotozoal, anthelmintics and sulfonamide drugs | L5 |
| C601.5 | apply concepts of drug design and QSAR for drug molecules | L3 |
| Pharmacology III – Theory (BP602T) : C602 | | |
| C602.1 | Outline the mechanism and pharmacology of drugs acting on respiratory system and gastrointestinal tract | L2 |
| C602.2 | Illustrate the general principles of chemotherapy and mechanism of antibiotic drugs | L2 |
| C602.3 | Apply the concept of the pharmacology of drugs used for TB, leprosy, fungal infections, malaria, and, amoebic infections | L3 |
| C602.4 | Determine the pharmacology of anticancer drugs, immunopharmacological drugs and protein drugs. | L5 |
| C602.5 | Interpret the principles involved in toxicology and chronopharmacology. | L5 |
| Herbal Drug Technology – Theory (BP603T) : C603 | | |
| C603.1 | Illustrate raw material as the source of cultivation to transformed herbal drug product. | L2 |
| C603.2 | Outline general aspects, health benefits and interaction of nutraceuticals | L2 |
| C603.3 | Identify the role of herbal excipients in herbal cosmetics and herbal formulations | L3 |
| C603.4 | Examine WHO and ICH guidelines for herbal drugs | L4 |
| C603.5 | Determine the different patenting herbal drugs and GMP. | L5 |
| Biopharmaceutics and Pharmacokinetics – Theory (BP604T) : C604 | | |
| C604.1 | Illustrate the fundamental concepts of biopharmaceutics including drug absorption, distribution, metabolism, and elimination. | L2 |
| C604.2 | Outline the mechanism and factors affecting drug absorption, distribution, metabolism, and excretion of drugs. | L2 |

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| C604.3 | Utilize concepts of bioavailability, bioequivalence, and techniques to enhance the dissolution and bioavailability of poorly soluble drugs. | L3 |
| C604.4 | Interpret one-compartment model for IV bolus, IV infusion, and oral drug administration with key parameters (KE, t _{1/2} , V _d , AUC, K _a , Cl _t , CLR). | L5 |
| C604.5 | Explain multiple compartment open model and nonlinear pharmacokinetics using appropriate pharmacokinetic parameters and Michaelis–Menten kinetics. | L5 |
| Pharmaceutical Biotechnology – Theory (BP605T) : C605 | | |
| C605.1 | Outline different fields of biotechnology including immobilization techniques, protein engineering, biosensors and industrial applications of microorganisms. | L2 |
| C605.2 | Illustrate principles, tools and steps involved in recombinant DNA technology and PCR for the production of pharmaceutical products of importance. | L2 |
| C605.3 | Utilize knowledge of immunity and blood products in preparation and applications of official vaccines and therapeutic biologicals. | L3 |
| C605.4 | Analyze immuno blotting techniques, microbial genetics, biotransformation and mutations as applied in pharmaceutical biotechnology. | L4 |
| C605.5 | Explain fermentation technology and collection, processing and storage of official blood and plasma substitutes | L5 |
| Quality Assurance –Theory (BP606T) : C606 | | |
| C606.1 | Outline the concepts of quality assurance, quality management and ICH guidelines. | L2 |
| C606.2 | Illustrate the ISO, NABL, QbD guidelines and cGMP aspects in the pharmaceutical industry. | L2 |
| C606.3 | Utilize the Good Laboratory Practice (GLP) guidelines and quality control tests in pharmaceutical testing facilities. | L3 |
| C606.4 | Analyze complaint management and documentation processes in the pharmaceutical industry. | L4 |
| C606.5 | Interpret the principles of calibration and validation and follow good warehousing practices. | L5 |
| Medicinal chemistry III – Practical (BP607P) : C607* | | |
| C607.1 | Make use of appropriate reactions to synthesize the drugs and intermediates | L3 |
| C607.2 | Apply purification techniques to perform assay and interpret results of selected drugs | L3 |
| C607.3 | Utilize microwave-assisted techniques for drug synthesis | L3 |
| C607.4 | Demonstrate preparation of medicinally important compounds using microwave irradiation technique and compare with conventional methods. | L5 |
| C607.5 | Outline chemical structures, reactions, and mechanisms using Chem Draw® software and physicochemical parameters using Lipinskies RO5 | L2 |

| Pharmacology III – Practical (BP608P): C608* | | |
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| C608.1 | Demonstrate dose calculation in pharmacological experiments | L2 |
| C608.2 | Build knowledge regarding the animal models involved in various diseases . | L3 |
| C608.3 | Examine the method for pyrogen testing in rabbits. | L4 |
| C608.4 | Analyze the acute eye irritation/skin irritation of a test substance | L4 |
| C608.5 | Experiment with different biostatistical methods in experimental pharmacology | L5 |
| Herbal Drug Technology – Practical (BP609P): C609* | | |
| C609.1 | Classify different preliminary phytochemical screening of crude drugs. | L2 |
| C609.2 | Make use of the various herbal formulations by using different test. | L3 |
| C609.3 | Apply the knowledge for monographic analysis of herbal drugs as per pharmacopoeias. | L3 |
| C609.4 | Compare parameters such as aldehyde and phenol contents. | L5 |
| C609.5 | Measure the total alkaloid content in leaves. | L5 |

| B. Pharmacy 8th Semester | | Mention Bloom Level (L1, L2 , L3, L4, L5, L6) |
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| Biostatistics and Research Methodology (BP801T) : C801 | | |
| After the completion of the course, students will be able to | | |
| Course Code | Course Outcomes | Bloom's Level |
| C801.1 | Explain fundamentals of statistics and biostatistics. | L2 |
| C801.2 | Illustrate data using correlation, regression and probability distributions in pharmaceutical problems. | L2 |
| C801.3 | Apply parametric and non-parametric statistical tests for different samples | L3 |
| C801.4 | Analyze the relationship between variables using regression modelling and online tools. | L4 |
| C801.5 | Explain design and analysis of experiments using factorial design and response surface methodology | L5 |
| Social and Preventive Pharmacy (BP802T) : C802 | | |
| C802.1 | Illustrate the concept of health and health education. | L2 |
| C802.2 | Outline awareness about various preventive measures for stated communicable and non-communicable diseases. | L2 |

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| C802.3 | Utilize national health programmes mentioned in real world to serve the society. | L3 |
| C802.4 | Compare various vaccines under national immunization programme and their schedule | L4 |
| C802.5 | Assess the impact of socio-cultural factors and urbanization on health. | L5 |
| Pharma Marketing Management (BP803ET) : C803 | | |
| C803.1 | Explain the different concepts of pharma marketing and market research. | L2 |
| C803.2 | Identify marketing mix for pharmaceutical products and product management in pharmaceutical industry. | L3 |
| C803.3 | Categorize the different types of sales promotion and determinants of the promotional mix in pharmaceutical marketing. | L4 |
| C803.4 | Interpret pharmaceutical marketing channels and future prospects of professional sale representatives. | L5 |
| C803.5 | Compare pricing of the pharmaceutical products with regulatory significance of DPCO and NPPA, and emerging marketing concepts. | L5 |
| Pharmaceutical Regulatory Science (BP804ET) : C804 | | |
| C804.1 | Outline the process of new drug discovery and development, including pre-clinical studies, clinical trials, and the concept of innovator and generic drug development. | L2 |
| C804.2 | Interpret the regulatory approval process (IND, NDA, ANDA), post-approval changes, and the role of major international regulatory authorities. | L2 |
| C804.3 | Explain the registration process of Indian pharmaceutical products in overseas markets and related regulatory documentation (DMF, CTD, eCTD, ACTD). | L5 |
| C804.4 | Examine the conduct of clinical trials, ethical requirements, and safety monitoring through pharmacovigilance. | L4 |
| C804.5 | Analyze the basic regulatory concepts, terminology, and key regulatory resources used in pharmaceutical regulation. | L4 |
| Pharmacovigilance (BP805ET) : C805 | | |
| C805.1 | Illustrate the foundation and importance of pharmacovigilance | L2 |
| C805.2 | Outline the terminology, classification & standards of PV | L2 |
| C805.3 | Identify Reporting , Communication & ADR Detection | L3 |
| C805.4 | Examine the special population and the safety Data generation | L4 |
| C805.5 | Explain importance of regulatory guidelines & documentation Skills | L5 |
| Quality Control and Standardization of Herbals (BP806ET) : C806 | | |

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| C806.1 | Apply analytical methods to evaluate the quality and authenticity of medicinal plant materials and their dosage forms. | L3 |
| C806.2 | Explain quality assurance principles in the herbal drug industry by understanding cGMP, GAP, GMP, GLP, and WHO guidelines for medicinal plants. | L5 |
| C806.3 | Illustrate EU and ICH guidelines for evaluating the quality, safety, and efficacy of herbal medicines. | L2 |
| C806.4 | Analyse chromatographic techniques and regulatory requirements for the standardisation and registration of herbal medicines. | L4 |
| C806.5 | Interpret WHO pharmacovigilance guidelines and the importance of bioactive markers in ensuring quality and safety of herbal medicines regulatory requirements. | L5 |
| Computer-Aided Drug Design (BP807ET) : C807 | | |
| C807.1 | Outline the concept of lead molecules in pharmaceutical drug discovery | L2 |
| C807.2 | Demonstrate theoretical knowledge of drug design into applications in pharmaceutical research | L2 |
| C807.3 | Apply QSAR and molecular docking techniques to predict biological activity of compounds | L3 |
| C807.4 | Analyze different strategies used for developing new drug-like molecules | L4 |
| C807.5 | Interpret docking scores and interaction patterns to assess the effectiveness of molecular modeling tools in new drug design | L5 |
| Cell and Molecular Biology (BP808ET) : C808 | | |
| C808.1 | Explain basic concepts of cell structure, membrane properties, and cellular organization. | L2 |
| C808.2 | Illustrate DNA, RNA, and the flow of genetic information through transcription and translation. | L2 |
| C808.3 | Analyze protein structure, amino acids, and the process of protein synthesis. | L4 |
| C808.4 | Explain genetics concepts including cell cycle, mitosis, meiosis, and genomic analysis. | L2 |
| C808.5 | Interpret cell signaling mechanisms, receptors, and signaling pathways. | L5 |
| Cosmetic Science (BP809ET) : C809 | | |
| C809.1 | Outline the evolution, types and applications of cosmetic products | L2 |
| C809.2 | Utilize appropriate formulation principles and develop skin and hair care product formulations | L3 |
| C809.3 | Build an understanding to illustrate the benefits of herbal cosmetics | L3 |
| C809.4 | Inspect suitable analytical methods for the evaluation of cosmetic products | L4 |

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| C809.5 | Interpret the problems related to cosmetic products and suggest ways to minimize them | L5 |
| Pharmaceutical Product Development (BP813ET) : C813 | | |
| C813.1 | Formulate different types of dosage forms | L6 |
| C813.2 | Examine the role of different pharmaceutical excipients in product development | L4 |
| C813.3 | Evaluate the different excipients for specific drug products. | L5 |
| C813.4 | Categorize different types of packaging for the drug product and materials used for packaging material. | L4 |
| C813.5 | Select optimization technique in the development of a pharmaceutical drug product. | L5 |
| C813.6 | Design the drug product by using principles of Quality by Design. | L6 |
| Project Work (BP814PW) : C814* | | |
| C814.1 | Explain the scientific background, literature, and theoretical concepts related to the selected research topic in pharmaceutical sciences. | L2 |
| C814.2 | Apply pharmaceutical research methodologies, analytical techniques, and laboratory skills to conduct the proposed research project. | L3 |
| C814.3 | Analyze and interpret research articles, experimental methods, and pharmaceutical data relevant to the project work. | L4 |
| C814.4 | Evaluate experimental results using statistical tools and scientific reasoning to draw meaningful conclusions. | L5 |
| C814.5 | Design and develop a systematic research report or thesis following standard scientific writing guidelines. | L6 |