PHARMACY DEPARTMENT

COURSE DESCRIPTION

Study Plan AY 2024-2025

1.	**Chemistry** **PHB 100**	This course provides fundamental knowledge of concepts and principles of chemistry essential for pharmacy students. It covers chemistry at an introductory level but with sufficient depth of understanding to facilitate a smooth transition to chemistry components in future studies. It covers chemical structure, bonding, and shapes, mass relationships in chemical reactions, reaction equilibrium, and introduction to functional groups for saturated and unsaturated hydrocarbons.
2.	**Pharmaceutical Organic Chemistry 1** **PHB 110**	Concepts in organic chemistry that apply to pharmaceutical sciences in general and medicinal chemistry in particular are covered in this course. Pharmaceutical Organic Chemistry 1 (PHB110), This course provides a comprehensive understanding of the fundamental principles underlying organic chemistry, it will focus on functional groups physicochemical properties and reactions. Throughout the course, students will explore foundational concepts of organic chemistry, such as heterocycles, aromatic compounds, and coordination compounds, and their importance to medicines. Through lectures, laboratory experiments, and problem-solving sessions, students will develop proficiency in analyzing and predicting the behaviour of organic molecules.
3.	**Pharmaceutical Organic Chemistry 2** **PHB 111**	Concepts in organic chemistry that apply to pharmaceutical sciences in general and medicinal chemistry in particular are covered in this course. Pharmaceutical Organic Chemistry 2 (PHB111) is a continuation of Pharmaceutical Organic Chemistry 1 (PHB110). It concentrates on a few key areas that are necessary to understand Medicinal chemistry. The first part of the course goes over stereochemistry, acid-base, and drug-receptor interactions. The second part of the course focuses on certain mechanisms of some organic reactions that are closely related to drug metabolism and the mechanisms of action of certain drugs.
4.	**Introduction to Pharmacy & Law** **PHB 120**	Introduction to Pharmacy and Law introduces students to the fundamentals of pharmacy practice, covering the history of pharmacy, Latin abbreviations, and the role of clinical pharmacists. The course focuses on developing communication skills, understanding pharmaceutical dosage forms, and mastering prescription protocols, helping students build essential competencies in patient interaction and medication management. Additionally, it provides an overview of UAE healthcare regulations, with particular attention to pharmacy legislation and the control of restricted substances. This foundation enables students to gain insights into the responsibilities and legal considerations integral to professional pharmacy practice.

5.	**Principle of Pharmacology PHB 113**	This course imparts students with fundamental knowledge in pharmacology and clinical aspects of medications, specifically focusing on the Autonomic, respiratory system, and autacoids. The objective is to enhance students' comprehension of pharmacodynamics and pharmacokinetic properties of drugs, enabling them to assess relevant factors in the management of patients with conditions related to the ANS, and respiratory systems. Additionally, the course equips students with the foundational knowledge necessary for therapy decision-making, managing individuals with, respiratory disorders, covering both the pharmacology and clinical aspects of medications
6.	**Pharmacology 1 PHB 214**	This course imparts students with fundamental knowledge in pharmacology and clinical aspects of medications, specifically focusing on the Central Nervous System and endocrine drugs. The objective is to enhance students' comprehension of pharmacodynamics and pharmacokinetic properties of drugs, enabling them to assess relevant factors in the management of patients with conditions related to the CNS, and endocrine disorders. Additionally, the course equips students with the foundational knowledge necessary for therapy decision-making, managing individuals with various common mental health, neurology, and endocrine disorders, covering both the pharmacology and clinical aspects of medications.
7.	**Medicinal Chemistry 1 PHB 211**	Medicinal Chemistry is a multidisciplinary field that integrates principles of organic chemistry, biochemistry, pharmacology, and molecular biology to discover, design, and develop therapeutic agents for the treatment of diseases. This course provides students with an in-depth understanding of the drugs pharmacokinetics (absorption and metabolism) and pharmacodynamics, as well as the influence of drugs' physicochemical properties, Structural-Activity Relationships (SAR), and Chemical mechanism of action. This course is horizontally integrated with Pharmacology 1, and therapeutics courses. Such as the Medicinal Chemistry of Autonomic and Central Nervous System, and Autacoids, the course is designed to provide pharmacy students with a comprehensive understanding of the basic chemical principles. It familiarizes the student with the organic medicinal agents chemistry, which is essential for efficient professional practice. In addition to providing pertinent information on the chemistry of drugs currently in use, enough focus is also placed on fundamental concepts to allow practitioners to stay proficient in drug chemistry throughout their professional careers.
8.	**Physical Pharmaceutics & Solution Formulations PHB 216**	This course builds a firm understanding of the physicochemical basis of pharmaceuticals and its impact on a drug's biopharmaceutical characteristics. This will set the foundation for students to understand the formulation of pharmaceutical dosage forms. This course subsequently covers principles and techniques involved in the formulation, preparation and evaluation of mono and biphasic liquid dosage forms.
9.	**Biochemistry PHB 114**	This course aims to introduce pharmacy students to essential elements of biochemistry. The course covers the structure and properties of biomolecules, nucleic acid metabolism, the characterization of major metabolic

		pathways. In the process, students will develop their abilities to integrate the fundamentals of biochemical information and their application to clinical practice.
10.	**Advanced Anatomy & Physiology** **PHB 210**	Advanced Anatomy and Physiology is a comprehensive course tailored to equip students with a deep understanding of the fundamental causes and mechanisms underlying diseases. Throughout this course, students delve into the intricate workings of cellular processes. Building upon foundational knowledge in anatomy and physiology, students will dissect the intricate pathways that lead to pathological conditions in the human body. Through a combination of theoretical study and practical application, students will gain insight into the dynamic interplay between physiological functions and pathological deviations. With a focus on integrating pathophysiological concepts across various organ systems, students will analyze and interpret the manifestations of disease within each major organ system. Through real-world examples that align with the field of phamacy practice, students will develop the critical thinking skills necessary to recognize, diagnose, and comprehend the implications of diverse pathological conditions.
11.	**Pharmacology 2** **PHB 215**	This course explores the complex realm of cardiovascular, gastrointestinal, and endocrine drugs, equipping students with a deep understanding of the mechanisms of action, therapeutic applications, and potential adverse effects linked to medications that impact these crucial systems. Through a blend of lectures and case studies, students will cultivate a robust knowledge foundation, allowing them to critically analyze and apply pharmacological principles in authentic clinical situations. The course emphasizes evidence-based decision-making, therapeutic monitoring, and the incorporation of drug therapy within the context of holistic patient care.
12.	**Medicinal Chemistry 2** **PHB 212**	This course is horizontally integrated with Pharmacology 2, in this course, we will provide the chemical basis for the interdisciplinary field of therapeutics, such as the Medicinal Chemistry of Cardiovascular, Chemotherapy, Antimicrobial Agents, and Endocrine Drugs course provides pharmacy students with a comprehensive exploration of the chemical properties, chemical mechanisms of action, and therapeutic applications of drugs targeting the cardiovascular, gastrointestinal, and endocrine systems. Through a blend of theoretical lectures, laboratory experiments, and case studies, students will delve into the molecular basis of drug interactions with physiological targets, including receptors, enzymes, and ion channels, relevant to these systems. Emphasis will be placed on understanding structure-activity relationships, pharmacokinetics, and pharmacodynamics of medications, as well as the integration of medicinal chemistry principles with pharmacological concepts to optimize therapeutic outcomes while minimizing adverse effects. Additionally, students will explore emerging trends in drug development and design, including novel therapeutic targets, drug delivery systems, and personalized medicine approaches for certain biological systems.

13.	**Microbiology & Immunology** **PHB 217**	This course covers fundamentals of microbiology and epidemiology. Students learn bacteriology, mycology, and virology. Emphasis will be given to classification, identification, and cultivation of bacteria. Bacterial, fungal, and viral diseases, drugs and vaccines used in these diseases also covered. Later, the course introduces role of immunology and protection from various infectious diseases. Human-microbe interaction, role of innate immunity, presentation of antigen and development of adaptive immunity will be taught. An introduction to autoimmune disorders and the use of antibodies in various medical conditions will also be provided.
14.	**Pharmaceutical Manufacturing & Technology** **PHB 218**	This course covers pharmaceutical manufacturing processes and quality control for capsules and tablets. Unit operations such as size reduction, powder flow, granulation, mixing, and compression will be covered. It also covers chemical kinetics, expiry date calculations, factors influencing drug and dosage forms stability as well as pre-formulation studies. The course also includes basic formulation principles and characteristics of aerosols and semisolids dosage forms. Later, it also introduces novel drug delivery systems.
15.	**Pharmaceutical Care** **PHB 222**	This foundational course introduces students to pharmaceutical care principles to prepare them for advanced medication therapy management. Through a blend of theoretical learning and practical application, students will develop a deep understanding of patient-centered care, medication safety, effective communication and ethics guiding pharmaceutical care. The course will cover a wide range of topics, including drug therapy problems, medication therapy management, medication reconciliation, and interprofessional collaboration. Students will also gain hands-on experience with MyDispense, a pharmaceutical care software, to enhance their practical skills. By the end of the course, students will be well-prepared to contribute to the delivery of safe and effective pharmaceutical care.
16.	**IPPE 1 Introductory Pharmacy Practice Experience 1** **PHB223**	This initial community pharmacy practice experience serves as an introductory opportunity for students to enhance their practical skills by engaging with pharmacists, pharmacy staff and patients. The primary objectives include expanding knowledge about medical reimbursement scheme in the UAE and understanding the specific policies about insurance. Trainees are expected to broaden their understanding of managing both over-the-counter (OTC) and prescription medications, as well as providing optimal care to patients through active listening to symptoms and recommending appropriate treatments or referring them to a physician when necessary. Additionally, students will learn inventory control procedures, order placement processes, and the utilization of electronic point-of-sale systems.
17.	**IPPE 2 Introductory Pharmacy Practice Experience 2**	This course provides students with the opportunity to apply the knowledge and skills learned in the classroom to a real-world community pharmacy setting. Students will work under the supervision of experienced pharmacists to gain hands-on experience in all aspects of community pharmacy practice.

	PHB224	
18.	**Pharmacotherapy 1** **PHB321**	**Pharmacotherapy I** equips students with a comprehensive understanding of therapeutic principles related to neurological, psychiatric, and inflammatory disorders, emphasizing the integration of medication therapy into holistic patient management plans. The course focuses on developing critical thinking and decision-making skills, enabling students to evaluate patient-specific factors, apply managed care pharmacy practices, and deliver Medication Therapy Management (MTM). Through interactive discussions, case studies, and hands-on experiences, students learn to provide patient education, counseling, and evidence-based recommendations to healthcare providers, optimizing therapeutic outcomes. By combining pharmacological knowledge with practical application, this course prepares students to excel in managing medication therapy for complex medical needs, contributing to enhanced patient care and outcomes in contemporary pharmacy settings.
19.	**Biopharmaceutical &Sterile Formulations** **PHB318**	This course provides an in-depth exploration of biopharmaceutical and sterile formulations, focusing on the development of parenteral formulations while adopting appropriate sterilization, contamination control and aseptic techniques. This module covers essential methods for ensuring the contamination-free products through comprehensive sterility testing methods, disinfection and preservation. This course also focuses on understanding the unique requirements of injectable formulations and rationalizing parenteral formulation decisions. Furthermore, it also covers the advanced formulation techniques tailored to biopharmaceutical products and strategies for enhancing protein stability, optimizing drug delivery systems, and maximizing biopharmaceuticals performance.
20.	**Public Health & Vaccination** **PHB327**	This course delves into the significant role of pharmacy within the public health context and extensively covers related aspects of vaccination. Covering topics from public health principles and health promotion to the foundational theories of disease prevention, the course provides an in-depth understanding of vaccine development, administration, and safety. Students will engage in case studies, interactive lectures, and practical workshops to develop skills in patient counseling, vaccine advocacy, and managing adverse events. The course also addresses social determinants of health, national health policies, and the ethical and legal aspects of vaccination, preparing students to actively support vaccine uptake and contribute meaningfully to public health initiatives.
21.	**Evidence-Based Medicine** **PHB 323**	This course is developed to improve students' knowledge regarding the following topics: introduction to evidence-based practice/medicine (EBP/EBM), basics of research and statistics (including measures, reliability, validity, and ethical concerns), assessment of clinical research proposals and reports, an overview of the FDA drug approval processes, and the five steps of EBP (identifying/formulating answerable

		questions, conducting information searches using active strategies, critically evaluating evidence, applying evidence in practice, and assessing EBP). Additionally, it introduces fundamental concepts related to drug information services, drug information requests, sources of drug information, evaluating internet health information, pharmacy information systems, drug utilization review, limitations of study designs, quality use of medicine, drug audits, continuing education for pharmacy and medical professionals, formulary management, and the utilization of micro-medics and up-to-date databases.
22.	**Institutional Pharmacy Practice** **PHB 324**	This course equips students with essential knowledge and skills in institutional pharmacy practice, focusing on the pharmacist's role in hospital pharmacy practice and services. Core topics include medication management reviews, drug information services, total parenteral nutrition (TPN), enteral and IV therapy, and palliative care. Students will develop proficiency in clinical decision-making, pharmaceutical calculations, and the preparation of extemporaneous formulations. The course underscores the principles of patient safety, therapeutic optimization, and effective collaboration within multidisciplinary healthcare teams.
23.	**Pharmacotherapy 2** **PHB 322**	This pharmacotherapy course is specifically designed to provide pharmacy students with a comprehensive understanding of the therapeutic management of cardiovascular, respiratory, and gastrointestinal conditions. The curriculum extensively covers the pharmacological principles, mechanisms of action, and clinical applications of medications used to treat these prevalent disorders. The course adopts an interdisciplinary approach, incorporating the synthesis of pharmacotherapy with lifestyle modifications and other non-pharmacological interventions, along with collaboration with healthcare professionals to ensure comprehensive patient care. Additionally, the focus on patient-centered care emphasizes personalized therapy, considering patient-specific factors, adherence, and monitoring. Case studies and simulated patient scenarios are employed to refine clinical decision-making skills. The course also explores emerging therapies and research trends, delving into cutting-edge advancements in pharmacotherapy for cardiovascular, respiratory, and gastrointestinal disorders. Rigorous critical evaluation of evidence-based practices is emphasized. Through a dynamic blend of theoretical knowledge and practical applications, this course empowers students to navigate and contribute effectively to the evolving landscape of pharmacotherapy, enhancing their ability to improve patient outcomes in diverse healthcare settings.
24.	**Pharmaceutical Analysis** **PHB315**	The course provides fundamental knowledge of the principles and techniques of pharmaceutical analysis used for qualitative and quantitative analysis of drugs. It introduces the theoretical background, practical skills, and regulatory requirements for analysing pharmaceutical drugs and their formulations. It equips students with practical experience in a wide range of modern instrumentations and techniques.

25.	**Pharmaceutical Calculation** **PHB320**	This course focuses on developing proficiency in foundational mathematical calculations essential for pharmaceutical sciences. Students will gain an understanding of international systems of units and measurements pertinent to pharmaceutical practice. The course emphasizes the interpretation of prescription orders and the execution of precise calculations for prescription preparation. Through practical applications, problem-solving exercises, and real-world scenarios, students will develop the skills and knowledge necessary for accurate and effective pharmaceutical calculations, ensuring their competence in pharmaceutical practice.
26.	**Biopharmaceutics and Pharmacokinetics** **PHB319**	This course covers factors influencing oral absorption of drugs and various reasons for poor absorption and reduced bioavailability. It also covers transport of drugs across the membrane and metabolic pathways. Later, students will learn drug disposition by studying compartmental and non-compartmental pharmacokinetic analysis. Effect of protein binding and metabolism on drug clearance will also be covered.
27.	**Non-RX Pharmacotherapy** **PHB325**	This course aims to acquaint students with non-prescription drugs, commonly known as over the counter (OTC) medications. When patients approach a pharmacist with a medical issue, the pharmacist's initial task is to decide if the issue can be handled through self-care. The course will focus on clinical scenarios where OTC products can be used in an evidence-based approach. It covers topics such as the causes of possible medical conditions treated with these drugs, drug pharmacology, self-administration methods, product selection considerations, and patient counseling.
28.	**IPPE 3 - Introductory Pharmacy Practice Experience 3** **PHB326**	In this placement, Students will understand unit-based pharmacy services, drug information services, hospital drug formulary management, outpatient dispensing, distribution services, and specialized sterile and cytotoxic dispensing. The course focuses on applying theoretical knowledge to various operational units within a hospital setting.
29.	**Clinical Toxicology** **PHB 328**	This course provides an in-depth study of the mechanisms of toxicity and the toxic effects of various agents on the human body. Students will explore the clinical implications of drug overdose, identify toxic signs and symptoms, and understand the impact of drug abuse. The course covers the toxicity of substances such as alcohol, barbiturates, hypnotics, inhalants, marijuana, nicotine, amphetamines, cocaine, and hallucinogens. Key topics include understanding how toxic agents disrupt biological systems, examining the adverse effects on the body, identifying signs and symptoms of drug overdose, and studying patterns of drug abuse and their toxicological implications. The course offers a substance-specific focus, detailing the acute and chronic toxicity, metabolic effects, withdrawal symptoms, sedative effects, overdose management, potential for long-term damage, psychoactive effects, dependence potential, mechanisms of addiction, cardiovascular risks, and neurological effects. Clinical features and management aspects are also covered, including recognizing and assessing clinical manifestations of toxicity, essential laboratory investigations for diagnosing and

		managing toxic exposures, principles of supportive care, and targeted treatments with specific antidotes and therapeutic measures for different toxic agents
30.	**Pharmaceutical Industry Experience – PIE** **PHB413**	The industrial placement provides an applied understanding of dosage form design, basic industrial processes in production, quality control and product packaging units that extends the theoretical knowledge of these operational units. The course enables to identify the main roles and responsibilities of industrial pharmacists by observing the industrial activities in research and development, quality control, production, marketing, and regulatory department.
31.	**Pharmacotherapy 3** **PHB423**	This Pharmacotherapy course delves into the therapeutic management of Endocrine, Renal, and Urological disorders, with a strong emphasis on the integral role pharmacists play in patient care. Exploring the pharmacological principles, mechanisms of action, and clinical applications of medications specific to these conditions, the course entails an in-depth study of diseases like diabetes, thyroid disorders, and hormonal imbalances. Students examine pharmacological interventions for renal impairments, including chronic kidney disease and glomerular disorders, as well as the analysis of urological conditions such as urinary tract infections, benign prostatic hyperplasia, and erectile dysfunction. The curriculum considers the mechanisms of action of drugs used in urological disorders and the impact of medications on renal function and overall patient health. Understanding the role of medications in restoring hormonal balance and managing endocrine-related diseases is a focal point. Throughout the course, there is an emphasis on the pharmacist's pivotal role in therapeutic decision-making, patient education, and medication management, achieved through collaboration with healthcare teams. Real-life case studies and practical scenarios are incorporated to enhance critical thinking and decision-making skills. The overarching goal is to empower pharmacy students with the knowledge and skills necessary to assume a central role in the therapeutic management of endocrine, renal, and urological disorders.
32.	**Pharmacoepidemiology & Pharmacovigilance** **PHB420**	The course is designed to provide students with a comprehensive understanding of the principles and methods used in pharmacoepidemiology and pharmacovigilance. This course delves into the study of the utilization and effects of drugs in large numbers of people, focusing on the identification and assessment of drug-related problems. It also covers the systematic monitoring, detection, assessment, understanding, and prevention of adverse effects or any other drug-related problems.
33.	**Pharmacy Management &**	This course combines evidence-based management theories with practical solutions and is designed to impart crucial skills to pharmacy students for all practice settings. It covers leadership, budgeting, human resource

	Pharmacoeconomics **PHB422**	management, inventory management, financial statements, risk management in pharmacy settings, and marketing, providing a well-rounded foundation for future pharmacy practitioners. The course emphasizes the development of analytical and decision-making skills necessary for devising basic marketing strategies within the pharmacy context. The Pharmacoeconomics component explores concepts and applications, addressing diverse evaluation methods to assess the costs, risks, and benefits of therapies. This equips students with decision-making proficiency based on a variety of pharmacoeconomic evaluation approaches.
34.	**Advanced Drug Delivery & Development** **PHB410**	The course will address advanced oral drug delivery technologies and targeted drug delivery systems for non-oral drug delivery routes, including transdermal, pulmonary, nasal, buccal, rectal, vaginal, ocular, intramuscular and subcutaneous with a detailed understanding of the specific biopharmaceutical and formulation considerations. This course also covers new drug development process for novel therapeutic agents, bioequivalence studies for generic formulations and good manufacturing practices and quality assurance in the pharmaceutical industry.
	Research Proposal **PHB411**	This course provides a comprehensive exploration of research methodologies in pharmacy, guiding students in the development of a research proposal. Emphasizing both collaboration and independent work, students will conduct literature reviews, engage in peer learning, and critically analyse existing research. The course covers qualitative, quantitative, and mixed-method approaches, teaching students how to differentiate and apply these in pharmacy research. Students will actively participate in formulating research questions, selecting methodologies, and designing study approaches, laying the foundation for future graduation projects. By the end of the course, students will have completed a comprehensive research proposal and acquired essential methodological skills to conduct impactful research in pharmacy.
35.	**Medical Biostatistics** **PHB412**	This course is designed to provide pharmacy students with a foundational understanding of biostatistics, the application of statistics in pharmacy-related research. Students will learn the principles of statistical inference, data analysis techniques, and the interpretation of statistical results. Emphasis will be placed on applying statistical concepts to pharmacy practice and research.
36.	**Pharmaceutical Compounding** **PHB421**	The Pharmaceutical Compounding course focuses on critical aspects of pharmaceutics through the preparation of extemporaneous compounds including solutions, suspensions, creams, emulsions, ointments, suppositories, and tablets and capsules. Students will engage in practical exercises and case studies reflective of clinical practice, enhancing their ability to prepare accurate formulations, apply pharmaceutical standards, and ensure effective patient care. This course cultivates skills in synthesizing information and implementing best practices in medication safety and quality improvement.

37.	**Pharmacotherapy 4** **PHB424**	The Pharmacotherapy of Infectious Diseases and Dermatology Disorders course is meticulously designed to provide pharmacy students with a profound understanding of managing infectious diseases and dermatological conditions. The curriculum extensively covers the pharmacological foundation of antimicrobial agents, emphasizing mechanisms of action and clinical applications. Special attention is given to the pharmacist's pivotal role in promoting antimicrobial stewardship and addressing challenges associated with infectious diseases. Through engaging lectures, case studies, and practical scenarios, students acquire essential knowledge and skills for navigating infectious disease intricacies. The overarching goal is to prepare students for a pivotal role within interdisciplinary healthcare teams, enabling effective contributions to infectious disease treatment and prevention while advocating for responsible antimicrobial use. Simultaneously, the course on Dermatology Disorders provides students with a comprehensive understanding of therapeutic principles related to skin health. Emphasizing the pharmacological foundation of dermatological agents, the course highlights the pharmacist's essential role in dermatological care. It explores pharmacotherapy protocols for common skin disorders, integrating evidence-based approaches and individualized patient care. With a dual focus, the course aims to prepare students to adeptly contribute to both infectious disease management and dermatological care within the healthcare landscape.
38.	**Pharmacogenomics & Precision Medicine** **PHB425**	The Pharmacogenomics & Precision Medicine course delves into the fusion of genetics, pharmacology, and healthcare, aiming to optimize drug therapy tailored to individual patients. Through a multidisciplinary approach, students explore key principles and applications, including genetic variations affecting drug response, genomic technologies like sequencing and genotyping, and how pharmacogenomic data personalizes drug therapy and informs dosage decisions. Ethical, legal, and social considerations, along with integration strategies into clinical practice, are addressed. The course also examines precision medicine's role across disease management, emphasizing patient education and counseling. Interactive lectures, case studies, and discussions facilitate a comprehensive understanding, equipping students to navigate the evolving realm of personalized medicine and enhance patient care outcomes.
39.	**Digital Pharmacy & Informatics** **PHB426**	This course is designed to introduce pharmacy students to telehealth, tele-pharmacy, and the use of artificial intelligence in pharmacy practice, with a focus on automation and robotics, driven by the COVID-19 pandemic. It aims to equip graduates with the skills needed for the changing healthcare landscape, emphasizing digital health and information technology. Students will learn to facilitate telepharmacy services within interdisciplinary teams and apply these skills in real-world settings. Topics covered include digital health tools, remote counseling, patient monitoring, electronic health records, e-prescribing, online pharmacy, telemedicine/telehealth, digital therapeutics, blockchain, ethics, innovation, data privacy, e-

		professionalism, reimbursement for digital health services, cybersecurity, mobile apps, wearable devices, clinical decision-making, and digital health literacy.
40.	**Phytotherapy** **PHB427**	Phytotherapy in Pharmacy Practice is a comprehensive course covering herbal medicines and marine products, offering pharmacy students a detailed understanding of their principles, applications, and evidence-based use in clinical settings. Through a blend of theory and practice, students explore pharmacology, therapeutic effects, safety considerations, and regulatory aspects of both herbal and marine-based remedies. Key topics include an introduction to phytotherapy and marine products, pharmacognosy, evidence-based evaluation, therapeutic applications, safety considerations, regulatory standards, and patient counseling. Through case studies, practical demonstrations, and discussions, students enhance their understanding and gain the skills needed to integrate evidence-based herbal and marine medicine into pharmacy practice, ensuring safe and effective patient care.
41.	***IPPE 4 - Introductory Pharmacy Practice Experience 4 (Academic and education)** **PHB723**	In this rotation, students will cultivate a deep comprehension of educational theories and methodologies. They will utilize this knowledge to design, implement, and assess one or more educational programs. This process will involve a thorough examination and application of relevant scholarly articles and research findings to bolster the activities undertaken during this rotation. Students will engage in critical analysis of current educational literature to inform their program planning and execution, ensuring their approaches are evidence-based and effective. Additionally, they will learn to adapt educational strategies to various learning styles and environments in addition to understanding the concepts of curriculum development & its quality assurance. This hands-on experience in educational program development and evaluation will enhance their pedagogical skills, preparing them for future roles where education and training are integral.
42.	***IPPE 4 Introductory Pharmacy Practice Experience 4 (Dig Health and automation)** **PHB724**	The "Digital Health and automation" training is designed for pharmacy students, focusing on integrating digital health into pharmacy practice. It covers the fundamentals of digital health, telepharmacy, digital therapeutics, data privacy, patient-centered technologies, and the latest innovations like AI in pharmacy. The course employs case studies, group discussions, and presentations from industry experts for a comprehensive learning experience. Students are assessed through participation, written assignments, and a final project involving digital health solutions. Preceptors and instructors play a crucial role in mentoring and guiding students through real-world applications. Students are expected to actively participate and demonstrate their understanding of digital health principles. The training course, a crucial part of the Introductory Pharmacy Practice Experiences (IPPE), prepares students to be proficient in the rapidly evolving field of digital health in healthcare.
43	***IPPE 4**	

	Introductory Pharmacy Practice Experience 4 (Pharmaceutical Marketing) **PHB725**	The Introductory Pharmacy Practice Experience (IPPE) in Pharmaceutical Marketing equips pharmacy students with foundational knowledge of marketing within the pharmaceutical industry. Through hands-on learning and practical exposure, students explore key aspects such as market analysis, promotional strategies, and regulatory compliance. They explore into fundamental concepts, conduct market research, and study various promotional methods. Emphasis is placed on understanding regulatory frameworks and fostering professional communication and ethical practices. Practical experiences, including shadowing professionals and engaging in marketing projects, allow students to apply theoretical learning in real-world contexts. Through reflective practice, students evaluate their experiences and develop skills for continuous improvement. By the course's conclusion, students gain a solid understanding of pharmaceutical marketing principles and practical skills applicable to future pharmacy careers, offering valuable insight into this dynamic industry.
44	***IPPE 4 Introductory Pharmacy Practice Experience 4 (Pharmacovigilance & RA)** **PHB726**	The Pharmacovigilance & Regulatory Affairs Placement is a specialized placement providing pharmacy students with practical experience in pharmacovigilance and regulatory affairs. The key objectives include exploring pharmacovigilance principles, hands-on experience in adverse reaction monitoring, and understanding its role in ensuring patient safety. Students will navigate regulatory frameworks, learn document compilation for drug approval, and grasp effective communication with regulatory agencies. The placement covers drug safety monitoring, risk management, quality assurance, and ethical considerations. Engaging with industry professionals and staying current on trends equips students for roles in ensuring compliant drug development and post-marketing surveillance. This experiential placement enhances students' skills for contributing to the pharmaceutical industry's safe and regulated practices.
45	***IPPE 4 Introductory Pharmacy Practice Experience 4 (Drug Discovery and Ddevelopment)** **PHB727**	The Drug Discovery course comprehensively examines discovering and developing new therapeutic agents. It covers the principles, methodologies, and techniques of identifying, designing, synthesizing, and testing potential drug candidates. Students will explore the interdisciplinary nature of drug discovery, incorporating elements of biology, chemistry, pharmacology, and computational science.
38.	***IPPE 4 Introductory Pharmacy Practice Experience 4 (Forensic Medicine)**	Forensic medicine is the application of medical knowledge to legal issues. This interdisciplinary field combines aspects of medicine, law, and science to investigate and determine the cause, manner, time, and circumstances of a person’s death. In this course, students will explore various topics essential to understanding the principles and practices involved in forensic medicine.

	PHB728	
46	**Pharmacotherapy 5** **PHB526**	The Pharmacotherapy in Oncology and Haematology course is meticulously designed to provide pharmacy students with a comprehensive understanding of the principles, applications, and challenges inherent in chemotherapy, specifically tailored for the treatment of cancer and haematological disorders. This curriculum delves into the pharmacological foundations of chemotherapy agents, intricately studying their pharmacodynamics and pharmacokinetics. Special attention is given to understanding the cellular targets and mechanisms of action specific to anticancer drugs. The course places a strong emphasis on the integral role of pharmacists in supporting oncology and haematology teams. Students will learn to ensure the safe and effective utilization of medications while adeptly managing therapy-related challenges. Topics covered include a comprehensive analysis of both common and severe side effects associated with chemotherapy, accompanied by strategies for managing and mitigating adverse effects, with a particular focus on supportive care. Pharmacy students will be immersed in the multidisciplinary nature of oncology care, understanding their pivotal role within collaborative teams. This involves integration into treatment planning, active participation in patient education, and diligent therapeutic monitoring. The curriculum delves into emerging trends in chemotherapy, discussing cutting-edge advancements, novel therapies, and targeted approaches in the dynamic field of cancer treatment. Ethical considerations in chemotherapy administration are thoroughly examined, ensuring students grasp the ethical dimensions of patient care. Principles of patient-centered care are woven into the course, enhancing communication skills and support throughout the treatment process. Through interactive discussions, case studies, and hands-on experiences, the course aims to equip pharmacy students with the knowledge and skills needed to excel in their role within oncology and haematology care, contributing significantly to improved patient outcomes in the challenging and evolving landscape of cancer therapy.
47	**Clinical Pharmacokinetics and drug Toxicity**	

	PHB520	Clinical Pharmacokinetics is an essential course within the pharmacy program, offering students a foundational understanding of the principles and practical applications of pharmacokinetics in clinical practice. This course emphasizes the quantitative aspects of drug absorption, distribution, metabolism, and excretion, providing students with the knowledge and skills necessary to optimize drug therapy in diverse patient populations. Topics covered include clinical pharmacokinetic and pharmacodynamic concepts such as linear versus nonlinear pharmacokinetics, clearance, volume of distribution, half-life, and Michaelis-Menten or saturable pharmacokinetics, along with clinical pharmacokinetic equations and calculations including one-compartment model equations for linear pharmacokinetics, designing individualized dosage regimens, multicompartment models, and calculation of pharmacokinetic parameters in research studies. Additionally, the course addresses drug dosing considerations in special populations such as patients with renal and hepatic disease, those undergoing dialysis, individuals with heart failure or obesity, and the management of drug interactions. Therapeutic drug monitoring (TDM) is also covered extensively, including TDM for antibiotics, cardiovascular agents, anticonvulsants, immunosuppressants, and other drugs, ensuring students are equipped to critically evaluate drug therapy regimens, optimize dosing strategies, and the assessment of drug toxicity in clinical settings, to ensure safe and effective pharmacotherapy for patients across various healthcare settings.
48	**Medication Therapy Management** **PHB521**	This course is designed to provide students with an in-depth understanding of Medication Therapy Management (MTM) principles, practices, and applications in contemporary pharmacy settings. The course explores the critical role of pharmacists in medication review and optimizing patient outcomes through effective medication management.
49	**Graduation Research Project** **PHB513**	The Graduation Research Project builds upon the foundational knowledge and skills acquired during the preceding Research Proposal course. This collaborative group project provides students with a unique opportunity to contribute new insights, address relevant research questions, and proactively solve challenges in their chosen field. Guided by faculty supervision, students will work both independently and as a cohesive team, honing their research and critical evaluation skills, essential for future roles as pharmacists. The course places a central focus on project planning, the development of robust methodologies, data analysis, and the effective dissemination of results. Students will not only assess the significance of their findings but also craft comprehensive reports, showcasing their ability to apply research principles in a real-world context.
50	**APPE-1 Internal Medicine** **PHB531**	During this rotation, students will acquire proficiency in internal medicine. Emphasis will be placed on developing advanced knowledge and skills necessary for delivering pharmaceutical care, particularly to patients admitted in the internal medicine wards. Learning opportunities will be facilitated through active

		participation in ward rounds alongside the healthcare team, engagement in student projects, presentations, and completion of tasks assigned by the preceptor.
51	**APPE-2 Surgery** **PHB532**	The Surgery Placement for Pharmacy Students offers a hands-on program focused on integrating pharmaceutical knowledge with surgical care in the healthcare sector. Students will gain practical insights into medication management throughout the surgical process, emphasizing optimization for enhanced patient outcomes. The key objectives include preoperative assessments, intraoperative support, postoperative care, and pain management, fostering collaboration within interdisciplinary surgical teams. Participants will become proficient in pharmacy protocols, patient education, infection control, and antimicrobial stewardship. This placement aims to equip students with valuable skills and experiences for a seamless integration of pharmaceutical expertise in surgical settings, preparing them for optimal patient care.
52	**APPE-3 Ambulatory Care** **PHB533**	This course provides students with an immersive learning experience in the field of ambulatory healthcare services through supervised clinical placement in primary care settings. Students will explore issues related to ambulatory healthcare services and will play an active role in the day-to-day activities of the pharmacy. They will work with other healthcare professionals and experience how the provision of primary care to patients is a team approach that includes pharmacy.
53	**APPE-4 Critical Care** **PHB534**	During this rotation, students will gain expertise in critical care medicine. The focus will be on developing advanced knowledge and skills essential for delivering pharmaceutical care to critically ill patients, with a particular emphasis on those admitted to the intensive and coronary care units. Additionally, students will acquire proficiency in dosage adjustment of common medications utilized in the ICU and CCU. Learning experiences will be facilitated through active participation in ward rounds with the healthcare team, engagement in student projects, and presentations, and the completion of tasks assigned by the preceptor.
54	**Pharmacy Elective Cosmetic & Cosmeceutical Formulations** **PHB711**	The course is designed to enable the student to be familiar with specific ingredients used in cosmeceutical and cosmetic formulations and their technical aspects especially related to skin, hair and nail cosmeceuticals. This module includes the application of sophisticated methodologies for evaluation of cosmeceuticals and emphasizes the importance of utilizing advance techniques to evaluate safety of cosmetics and cosmeceuticals.
55	**Pharmacy Elective Complementary and Alternative Medicines**	This course is designed to provide students with a comprehensive understanding of various non-conventional medical practices, their historical background, and their potential applications in modern

	PHB721	healthcare. The course aims to equip students with the knowledge required to critically evaluate the safety, efficacy, and ethical considerations of complementary and alternative medicine (CAM) practices.
56	**Pharmacy Elective Clinical Nutrition** **PHB722**	Clinical Nutrition for the Pharmacy Program is a specialized course tailored to equip pharmacy students with comprehensive understanding and practical skills in the realm of nutrition within healthcare and pharmacy practice. Combining theoretical foundations with real-world applications, students investigate the pivotal role of nutrition in health promotion, disease prevention, and management across various medical conditions. Fundamental principles encompass macronutrients, micronutrients, dietary guidelines, and recommended dietary allowances (RDAs), alongside techniques for assessing nutritional status in patients, catering to diverse demographic groups from infants to older adults. Emphasis is placed on nutrition's impact on chronic diseases like obesity, diabetes, cardiovascular ailments, and cancer, as well as the intricate interplay between drugs and nutrients, influencing absorption, metabolism, and therapeutic outcomes. Through medical nutrition therapy (MNT), students explore enteral and parenteral nutrition support, dietary modifications, and supplementation, while honing skills in counseling, goal setting, and fostering behavioral changes in patients. Critical appraisal of scientific literature and evidence-based practice underpins the curriculum, complemented by hands-on experiences via case studies, practical exercises, and clinical simulations. By course culmination, students emerge adept at integrating nutrition interventions into their pharmacy practice, thereby enhancing patient outcomes and healthcare delivery at large.
57	**Pharmacy Elective Artificial Intelligence Assisted Drug Discovery** **PHB714**	The Artificial Intelligence Assisted Drug Discovery course provides a comprehensive exploration of the synergy between artificial intelligence (A.I.) and pharmaceutical research. Designed to equip students with cutting-edge skills, the course delves into AI applications, historical evolution, and challenges in drug discovery. Key components include data mining and analysis, predictive modeling, virtual screening, structural bioinformatics, deep learning, cheminformatics, ethical considerations, and industry perspectives. Through a dynamic mix of lectures, hands-on exercises, case studies, and collaborative projects, participants gain the knowledge to apply AI in addressing complex challenges within drug discovery. By course completion, students possess a nuanced understanding of AI's role in advancing pharmaceutical research, ready to contribute to this interdisciplinary field's exciting developments.
58.	**Pharmacy Elective Pharmaceutical Biotechnology** **PHB701**	This elective course explores the role of Microbiology and Biotechnology in Pharmaceuticals with particular emphasize on pharmaceutical Industry. This elective course focuses on the development various pharmaceutical products based on microbiology and biotechnology concepts. It covers production of pharmaceuticals by fermentation, bioconversion, and DNA recombinant technology.