Clemson University
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Education & Training Plan
Pharmacy Technician Certification Program with Externship

Student Full Name: _____

Start Date: _____ End Date: _____

Program includes National Certification & an Externship Opportunity
Mentor Supported

Clemson University Program with Externship
Course Code: CLEM-PT 01
Program Duration: 4 Months
Course Contact Hours: 375
Student Tuition: $3,000.00

The Pharmacy Technician Profession

The need for Pharmacy Technicians continues to grow with demand expected to increase substantially through 2030. Technicians work under the supervision of a registered pharmacist in hospitals, home infusion pharmacies, community pharmacies and other healthcare settings. This high demand for pharmacy technicians is the result of a multitude of factors including the constant availability of new drugs, the national shortage of registered pharmacists, the establishment of certified pharmacy technicians, and the aging population. Approximately 400,000 technicians will be employed by the year 2022 to meet our nation's growing healthcare demands.

The Pharmacy Technician Program

This comprehensive course will prepare students to enter the pharmacy field and take the Pharmacy Technician Certification Board's PTCB exam. Course content includes pharmacy medical terminology, reading and interpreting prescriptions and defining generic and brand names drugs and much, much more! Program also includes a clinical externship at a local healthcare provider! This program will prepare students to enter the pharmacy field and to pursue certification including the Pharmacy Technician Certification Board's PTCB exam. This course covers the following key areas and topics:

- Pharmacy calculations
- Medical terminology specific to the pharmacy

- Skills to read and interpret prescriptions
- Review of the top 200 drugs
- Skills to identify drugs by generic and brand names
- Dosage calculations, I.V. flow rates, drug compounding, and dose conversions
- Dispensing of prescriptions, inventory control, and billing and reimbursement

Education and National Certifications

- Pharmacy Technicians should have or be pursuing a high school diploma or GED.
- Students who complete this course are prepared for national certification:
    - **Pharmacy Technician Certification Board (PTCB) national technician certification exam**

Pharmacy Technician Detailed Course Information:

- The history of pharmacy and healthcare
- Pharmacy technician role and responsibilities
- Pharmacy technician certification and registration process
- Types of pharmacies including the hospital pharmacy, retail practice, long-term care practice, mail order pharmacy, home care pharmacies, and others
- Drug regulation and control
- Pharmaceutical terminology and related anatomy
- Parts of the prescription and labeling; Pharmacy calculations and math review
- Pharmacy measures and abbreviations; Routes and formulations
- Parenterals and compounding
- Basic biopharmaceutics
- Aseptic technique and the handling of sterile products
- Total Parenteral Nutrition (TPN)
- Basics of IV solutions and calculating 24-hour supply of IV solutions
- Factors affecting drug activity
- Information and pharmacy resources
- Inventory management and financial issues
- Brand names and generic drugs; Drug names and drug classes

National Certification

Students who complete the Clemson University Pharmacy Technician program will be prepared to sit for the Pharmacy Technician Certification Board (PTCB) national certification exam(s). In order to work as a Pharmacy Technician, many states nationwide are requiring that learners achieve national certification prior to working in that state. Students who complete this program are encouraged to complete the practical/clinical externship option with their program. This comprehensive program is designed to prepare students to sit for Pharmacy Technician Certification Board (PTCB) exam(s). Students who complete this program can and do sit for the Pharmacy Technician Certification Board (PTCB) national certification exam(s) and are qualified, eligible and prepared to do so.

Externship / Hands on Training / Practicum

Although not a requirement, once students complete the program, they have the ability to participate in an externship and/or hands on practicum so as to practice the skills necessary to perform the job requirements of a professional in this field. Students will be assisted with completing a resume and/or other requirements

necessary to work in this field. All students who complete this program are eligible to participate in an externship and will be placed with a participating organization near their location. The institution works with national organizations and has the ability to place students in externship opportunities nationwide.

Clemson University contact: If students have any questions regarding this program including national certification and externships **, they should call Salley Ouellette of Clemson University at | (864) 656-2200 or via email at palmer4@clemson.edu**

Note : No refunds can be issued after the start date published in your Financial Award document.

About Clemson University!

Clemson Online, a unit reporting directly to the Provost, works closely with leadership teams across the University to develop, market, and deliver top-quality courses and programs in blended and online formats. The office provides vision, leadership, coordination, and expertise in support of faculty design, delivery, and evaluation of technology-enhanced, blended, and fully online courses and instructional materials. Dynamic, transformative, and unique eLearning opportunities characterize Clemson's approach to online teaching and learning.

Our Mission: Clemson Online provides strategic leadership for online education, emphasizing innovative teaching and superior learning outcomes to maximize student success in 21st-century academic and professional contexts.

Our Vision: Clemson Online will define the public web-grant university through measurable achievements in online education, research, and service. The office is committed to pursuing strategic opportunities, providing supportive resources, promoting superior educational quality, and ensuring faculty involvement and responsibility in shaping Clemson's online future.

Clemson University and Pearson Education
Clemson University's eLearning programs were developed in partnership with Pearson Education to produce the highest quality, best-in-class content and delivery necessary to enhance the overall student learning experience, boost understanding and ensure retention. Pearson Education is the premier content and learning company in North America offering solutions to the higher education and career training divisions of colleges and universities across the country aimed at driving quality education programs to ensure student success. Please visit us at **www.pearson.com** .

About Pearson Education
Welcome to Pearson. We have a simple mission: to help people make more of their lives through learning. We are the world's leading learning company, with 40,000 employees in more than 80 countries helping people of all ages to make measurable progress in their lives. We provide a range of education products and services to institutions, governments and direct to individual learners, that help people everywhere aim higher and fulfil their true potential. Our commitment to them requires a holistic approach to education. It begins by using research to understand what sort of learning works best, it continues by bringing together people and organizations to develop ideas, and it comes back round by measuring the outcomes of our products.

Pharmacy Technician Program Detailed Objectives:

HISTORY OF PHARMACY PRACTICE

- Describe the origins of the practice of pharmacy from the Age of Antiquity
- Explain the changes in the practice of pharmacy during the Middle Ages
- Describe changes in the practice of pharmacy during the Renaissance
- List significant milestones for the practice of pharmacy from the 18th, 19th, and 20th centuries
- Describe the role biotechnology and genetic engineering could have on the future of pharmacy practice

THE PROFESSIONAL PHARMACY TECHNICIAN

- Summarize the educational requirements and competencies of both pharmacists and pharmacy technicians
- Describe the basic roles of pharmacists and pharmacy technicians working in the two primary pharmacy practice settings
- Explain six specific characteristics of a good pharmacy technician
- Describe the behavior of a professional pharmacy technician
- Explain the registration/licensure and certification process for becoming a pharmacy technician

HISTORY OF PHARMACY PRACTICE

- Describe the communication process
- Explain the three types of communication
- Summarize the various barriers to effective communication
- Describe the primary defense mechanisms
- Describe specific strategies for eliminating barriers to communication
- Summarize the elements of and considerations in caring for patients
- List the Five Rights of medication administration

PHARMACY LAWS AND ETHICS

- Classify the various categories of United States law
- Describe the function(s) of the regulatory agencies that oversee the practice of pharmacy
- Summarize the significant laws and amendments that affect the practice of pharmacy
- Recognize and use a drug monograph
- Define ethics and moral philosophy
- Explain some specific ethical theories
- Summarize the Pharmacy Technician Code of Ethics
- Explain the importance of confidentiality for personal health information
- Describe each of the five schedules of controlled substances and the drugs assigned to each schedule

TOP 200 DRUGS, PHARMACY ABBREVIATIONS, AND TERMINOLOGY

- Identify selected root words used in pharmacy practice
- Correctly use selected prefixes and suffixes in conjunction with root words
- Interpret common abbreviations used in pharmacy and medicine
- List abbreviations that are considered dangerous and explain why

- Recognize common drug names and their generic equivalents
- Define common pharmacy and medical terminology
- Explain a variety of drug classifications
- Memorize the Top 200 Drug list

DOSAGE FORMULATIONS AND ROUTES OF ADMINISTRATION

- Explain drug nomenclature
- Define medication error
- Explain the rights of medication administration

REFERENCING AND DRUG INFORMATION RESOURCES

- Describe the commonly used pharmacy resources in both retail and hospital-based settings including how they are organized
- Describe the steps for referencing drug information resources

RETAIL PHARMACY

- Interpret common abbreviations used in pharmacy and medicine
- Recognize common drug names and their generic equivalents
- Explain the ambulatory pharmacy practice setting
- Describe the two main types of retail pharmacies
- List the various staff positions in retail pharmacies
- Describe the typical work environment of a retail pharmacy practice
- List the legal requirements of a prescription medication order
- Describe the different ways prescriptions arrive at a retail pharmacy
- List the steps required for a prescription to be filled
- Describe the various job duties of technicians in retail pharmacies
- Explain the importance of confidentiality for personal health information
- List the necessary components of a medication order
- Identify various dosage formulations

HEALTH-SYSTEM PHARMACY

- List the legal requirements of a prescription medication order
- List the steps required for a prescription to be filled
- Explain the importance of confidentiality for personal health information
- Describe the advantages of the unit-dose system
- List the necessary components of a medication order
- Compare centralized and decentralized unit-dose systems
- Compare the duties of a technician with those of a pharmacist in filling medication orders in a health-system setting
- Define the tasks pharmacy technicians perform in health-system settings

TECHNOLOGY IN THE PHARMACY

- List the hardware and software components used in pharmacy computers and summarize their purpose
- Describe the use of automation and robotics in pharmacies
- Summarize the uses of personal digital assistants in medicine

- Describe telepharmacy practice
- Summarize the impact of patient confidentiality regulations on the use of technology in the pharmacy
- Identify the names and uses of at least two drugs developed by using recombinant DNA technology
- Explain the four steps in the genetic-engineering process

INVENTORY MANAGEMENT

- Describe the various purchasing systems used in pharmacies
- Describe the various methods of purchasing available to pharmacies
- Outline the steps necessary for placing orders
- Outline the steps necessary for receiving orders
- Explain the reasons for product returns and the process of making returns

INSURANCE AND THIRD-PARTY BILLING

- Describe prescription formularies
- Differentiate Medicare and Medicaid
- Define terms commonly used in insurance billing
- Summarize the data collected and transmitted for insurance purposes
- Describe common insurance billing errors

OVER-THE-COUNTER (OTC) PRODUCTS

- Describe the drugs in the Top 200 Drug list in terms of brand and generic name, drug classification, uses, and special details
- Describe durable medical equipment, diagnostic devices, and supplies commonly seen in the pharmacy

INTRODUCTION TO COMPOUNDING

- Explain the purpose for compounding prescriptions
- Describe the basic procedures involved in compounding
- Describe the equipment, supplies, and facilities required for compounding
- List the major dosage forms used in compounding
- Explain the considerations involved in flavoring a compounded prescription

INTRODUCTION TO STERILE PRODUCTS

- List the equipment and supplies used in preparing sterile products
- List the routes of administration associated with sterile products
- Describe the special concerns regarding chemotherapy and cytotoxic drugs

BASIC MATH SKILLS

- Determine the value of a decimal
- Add, subtract, multiply, and divide decimals
- Change Roman numerals to Arabic numerals
- Change Arabic numerals to Roman numerals
- Describe the different types of common fractions
- Add, subtract, multiply, and divide fractions
- Solve math problems by using ratio and proportions

MEASUREMENT SYSTEMS

- List the three fundamental systems of measurement
- List the three primary units of the metric system
- Define the various prefixes used in the metric system
- Identify abbreviations used in measurements
- Explain the use of International Units and Milliequivalents
- Convert measurements between the household system and the metric system
- Convert measurements between the apothecary system and the metric system
- Perform temperature conversions

DOSAGE CALCULATIONS

- Calculate the correct number of doses in a prescription
- Determine the quantity to dispense for a prescription
- Perform multiple dosage calculations for a single prescription
- Calculate accurate dosages for pediatric patients
- Convert a patients weight from pounds to kilograms
- Perform dosage calculations based on mg/kg/day

CONCENTRATIONS AND DILUTIONS

- Calculate weight/weight concentrations
- Calculate weight/volume concentrations
- Calculate volume/volume concentrations
- Calculate dilutions of stock solutions

ALLIGATIONS

- Explain when to use the alligation principle for calculations
- Calculate and solve a variety of alligation-related problems

PARENTERAL CALCULATIONS

- Illustrate the principle of basic dimensional analysis
- Calculate flow duration for parenteral products
- Calculate the volume per hour for parenteral orders
- Calculate the drug per hour for parenteral products
- Calculate drip rates in both drops/minute and milliliters/hour
- Calculate TPN milliequivalents

BUSINESS MATH

- Perform basic business math calculations commonly seen in the pharmacy setting

THE BODY AND DRUGS

- Explain the differences between pharmacodynamics and pharmacokinetics
- Summarize the ways in which cell receptors react to drugs

- Describe the mechanism of action and its key factor
- Explain how drugs are absorbed, distributed, metabolized, and cleared by the body
- Explain the difference between fat-soluble and water-soluble drugs and give examples of each
- Explain the effect of bioavailability and its relationship to drug effectiveness
- Describe addiction and addictive behavior
- Describe the role of the pharmacy technician in identifying drug-abusing patients
- Identify some drugs that interact with alcohol

THE SKIN

- Diagram the basic anatomical structure of the skin
- Explain the function or physiology of the skin
- Describe common diseases affecting the skin and the causes, symptoms, and pharmaceutical treatments associated with each disease

THE EYES AND EARS

- Diagram the basic anatomical structure and parts of the eye and ear
- Describe the function or physiology of the eyes and ears
- Describe common diseases affecting the eyes and ears and the causes, symptoms, and pharmaceutical treatments associated with each disease

THE GASTROINTESTINAL SYSTEM

- Describe the physiology of the digestive system
- Describe the three main categories of nutrients
- Describe the functions and AMDR of the macronutrients
- Differentiate between essential and nonessential amino acids
- Identify the functions, symptoms of deficiencies, and Reference Daily Intakes (RDIs) of the micronutrients
- Identify the basic anatomical and structural parts of the respiratory system

THE MUSCULOSKELETAL SYSTEM

- Diagram the basic anatomical structure and parts of the muscles and bones
- Describe the functions and physiology of the muscles and bones
- Describe common diseases affecting the muscles and bones and the causes, symptoms, and pharmaceutical treatments associated with each disease
- Describe the mechanisms and the complications of the following musculoskeletal diseases and how each class of drugs works: osteomyelitis, osteoporosis, osteoarthritis, gout, inflammation, multiple sclerosis, and cerebral palsy
- List the indications for use and mechanisms of action of ASA, NSAIDs, COX-2 inhibitors, antigout agents, calcitonin, bisphosphonates, SERMs, and skeletal muscle relaxants

THE RESPIRATORY SYSTEM

- Describe the function or physiology of the individual parts of the respiratory system and the external exchange of oxygen and waste
- Describe common diseases affecting the respiratory tract and the causes, symptoms, and pharmaceutical treatments associated with each disease

- Identify the trade and generic names and classification of various drugs used in treatment of diseases and conditions of the respiratory tract
- Identify the basic anatomical and structural parts of the respiratory system

THE CARDIOVASCULAR, CIRCULATORY, AND LYMPH SYSTEMS

- Diagram the basic anatomical structure and parts of the heart
- Explain the function of the heart and the circulation of the blood within the body
- Describe common diseases affecting the heart including the causes, symptoms, and pharmaceutical treatments associated with each disease
- Describe the mechanism of action of anticoagulants, indications for their use, and antidotes of overdose
- Differentiate between HDL, LDL, and triglycerides
- List the total cholesterol, LDL, HDL, and triglyceride ranges for an average adult
- Describe the structure and main functions of the lymphatic system, as well as its relationship to the cardiovascular system

THE IMMUNE SYSTEM

- Explain how the bodys non-specific and specific defense mechanisms work to keep the body safe from disease-causing microorganisms
- Summarize the basic relationships between the immune system and the various body systems
- Describe the different types of infectious organisms
- Describe HIV-1 and HIV-2 and the various subgroups of HIV
- List the five stages of the progression of HIV to AIDS
- Explain how the different classes of HIV drugs work
- Describe autoimmune disease and identify various types
- Summarize how drug resistance develops and what steps can be taken to stop it
- Describe common anti-infective drug classifications, their mechanisms of action, and their side effects
- Describe tuberculosis and malaria and their causes, treatments, and prevention
- Summarize the different types and uses of vaccines and how they work in the body

THE RENAL SYSTEM

- Diagram the basic parts of the renal system
- Explain the functions of the nephron, kidney, and bladder
- Describe common diseases and conditions affecting the renal system and the mechanisms of action of each class of drugs used to treat each disease
- Explain how homeostasis of fluid and electrolytes affects the body

THE ENDOCRINE SYSTEM

- Describe the glands of the endocrine system
- Describe the functions of the hypothalamus and pituitary gland, and the other body parts that are affected by these glands
- Identify the hormones of the endocrine system and which gland or organ secretes each hormone
- Describe male and female hormones and some products used for replacement in cases of deficiency of these hormones
- Describe the major diseases and conditions that affect the endocrine system
- Compare diabetes mellitus and diabetes insipidus
- Summarize the effects of anabolic steroid use

THE REPRODUCTIVE SYSTEM

- Diagram the basic anatomical structures and parts of the male and female reproductive systems
- Describe the functions and physiology of the male and female reproductive systems and the hormones that govern them
- Describe common diseases affecting the male and female reproductive systems and the causes, symptoms, and pharmaceutical treatments associated with each disease and condition
- Describe the indications for use and mechanisms of action of various contraceptives

THE NERVOUS SYSTEM

- Explain the functions of the nervous system and its division into the central and peripheral nervous systems
- Differentiate between the sympathetic and parasympathetic nervous systems
- Describe the function or physiology of neurons or nerve transmission and the various neurotransmitters
- Explain the relationship of the nervous system to the other body systems
- Describe the functions of the blood-brain barrier and the types of substances that will not cross it
- Describe common diseases affecting the nervous system and the causes, symptoms, and pharmaceutical treatments associated with each disease Identify the common drugs used to treat diseases and conditions of the nervous system

MEDICATION ERRORS

- Explain strategies and practices used to eliminate medication errors

WORKPLACE SAFETY AND INFECTION CONTROL

- Describe the behavior of a professional pharmacy technician
- Describe the function(s) of the regulatory agencies that oversee the practice of pharmacy
- Summarize the significant laws and amendments that affect the practice of pharmacy
- Explain the workplace safety requirements and practices in the pharmacy setting

PEDIATRIC AND GERIATRIC PATIENTS

- Explain the considerations involved in flavoring a compounded prescription
- Describe the differences between neonatal and pediatric patients
- Explain how the processes of pharmacokinetics in pediatric patients affect drug dosing
- Explain pediatric drug administration and dosage adjustment considerations
- Describe the physiological changes that occur in geriatric patients
- List several factors that affect pharmacokinetic processes in geriatric patients
- Describe polypharmacy and noncompliance in geriatric medication therapy
- Explain Medicare Part D and its effects on medication dispensing to the geriatric population
- Explain ways in which geriatric medication dispensing will change in the future, and how extended life expectancy will change pharmacy practice

BIOPHARMACEUTICALS

- Identify the names and uses of at least two drugs developed by using recombinant DNA technology
- Explain the four steps in the genetic-engineering process

- Explain briefly how a company gets approval for a biopharmaceutical drug from the FDA
- Describe why biopharmaceuticals, genetic engineering, and stem-cell research are important in the future of pharmacy and the practice of medicine

Note: This program can be completed in 6 months. However, students will have online access to this program for a 24-month period.

MICROSOFT OFFICE

- Module Use an integrated software package, specifically the applications included in the Microsoft Office suite
- Demonstrate marketable skills for enhanced employment opportunities
- Describe proper computer techniques for designing and producing various types of documents
- Demonstrate the common commands & techniques used in Windows desktop
- List the meaning of basic PC acronyms like MHz, MB, KB, HD and RAM
- Use WordPad and MSWord to create various types of documents
- Create headings and titles with Word Art
- Create and format spreadsheets, including the use of mathematical formulas
- Demonstrate a working knowledge of computer database functions, including putting, processing, querying and outputting data
- Define computer terminology in definition matching quizzes
- Use the Windows Paint program to alter graphics
- Use a presentation application to create a presentation with both text and graphics
- Copy data from one MS Office application to another application in the suite
- Use e-mail and the Internet to send Word and Excel file attachments
- Demonstrate how to use the Windows Taskbar and Windows Tooltips
- Explain how copyright laws pertain to data and graphics posted on the Internet
- Take the college computer competency test after course completion
- Follow oral and written directions and complete assignments when working under time limitations

Note: Although the Microsoft Office Module is not required to successfully complete this program, students interested in pursuing free Microsoft MOS certification may want to consider completing this Microsoft Office Module at no additional cost.

System Requirements:

Windows Users:

- Windows 8, 7, XP or Vista
- 56K modem or higher
- Soundcard & Speakers
- Firefox, Chrome or Microsoft Internet Explorer

Mac OS User:

- Mac OS X or higher (in classic mode)
- 56K modem or higher
- Soundcard & Speakers
- Apple Safari

iPad Users:

- Due to Flash limitations, eLearning programs are NOT compatible with iPads

Screen Resolution:

- We recommend setting your screen resolution to 1024 x 768 pixels.

Browser Requirements:

- System will support the two latest releases of each browser. When using older versions of a browser, users risk running into problems with the course software.
- Windows Users: Mozilla Firefox, Google Chrome, Microsoft Internet Explorer
- Mac OS Users: Safari, Google Chrome, Mozilla Firefox

Suggested Plug-ins:

- Flash Player
- Real Player
- Adobe Reader
- Java