

Year 1

Theme: Dosage Forms

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Prologue	Block 1 (13 wk)	Block 2 (7 wk)	Block 3 (7 wk)	Block 4 (8 wk)
	Human Structure	Molecules to Cells	Physiologic Basis of Medicine	Brain, Mind & Behavior
	Pharmaceutics with Practice Lab			
	Health Information Literacy			
	Pharmacy & US Healthcare System	Evidence Based Medicine	Parenteral Products with Lab	
	Clinical Research Design			
	Pharmacist Patient Care Experiences	Pharmacist Patient Care Experiences	Pharmacist Patient Care Experiences	Pharmacist Patient Care Experiences

Course: Prologue

Year, Block Offered: Year 1

Hours Per Week: 22

Duration in Weeks: 3

Step in Curriculum: 1

Course Description: Prologue serves as the introductory course for formal didactic class work and for the four year continuous, integrated experiential program. Prologue orients students to medical and pharmacy school at the levels of profession, patient, and society; prepares students initially for academic, career and life success; and engages students in the process of becoming physicians or pharmacists. Medical and pharmacy students will learn teamwork through classroom assignments and staged scenarios involving actors. The skills learned in Prologue will establish a foundation for professional growth that is enhanced in the Pharmacy Patient Care Experience sequence that begins upon completion of Prologue. The course emphasizes the “5 Cs” of interprofessional education at the Northeastern Ohio Universities Colleges of Medicine and Pharmacy: Character, Caring, Competence, Communication, and Community.

Objectives: By the end of the course, the student will be able to:

1. comprehend their role as medical or pharmacy student and understand the importance of establishing an initial identity as a physician or pharmacist.
2. appreciate the importance of basic skills and demonstrate competence in providing compassionate care for individuals, families, and communities.
3. understand professionalism as a core element necessary for entry into the professions of medicine or pharmacy.
4. recognize the importance of public health and primary care perspectives on patient care.
5. convey an attitude of service to society and the health professions.
6. understand the inter-relationship between basic, behavioral, clinical and community health sciences.

Director: Paul J. Hartung, Ph.D., Behavioral Sciences

Co-Director: Janis J. MacKichan, Pharm.D., Pharmacy Practice

HPE Coordinator: Laurie Zupp

Course: Human Structure

Year, Block Offered: Year 1, Block 1

Hours Per Week: 3

Duration in Weeks: 13

Step in Curriculum: 1

Course Description: This course focuses on the biological systems of the human body, with attention to tissues, organs, organ systems, and the organism as a whole. The course integrates essential aspects of embryology, epigenesis, anatomy, physiology, histology, and immunology, thereby providing a fundamental overview of the human body. Prosected models are used, and surface anatomy is integrated with the prosection. Students obtain a knowledge base upon which they can build an understanding of the anatomical location and physiological functions of drug action.

Objectives: By the end of the course, the student will be able to:

1. demonstrate an understanding of the basic development and developmental defects of a human organism.
2. distinguish the basic microscopic structure of human cells, tissues, and organs.
3. identify the basic structure and functions of human organ systems.

Director: Steven Ward, Ph.D., Anatomy

Co-Director: Cornelis Van der Schyf, Ph.D.; Pharmaceutical Sciences

HPE Coordinator: Pat Nuznoff

Course:	Pharmaceutics with Practice Lab
Year, Block Offered:	Year 1, Block 1
Hours Per Week:	5 + 3 hrs lab per week + 3 hrs OTC every other week x 6 weeks = 122 total hrs
Duration in Weeks:	13
Step in Curriculum:	1
Course Description:	<p>This course provides students with basic knowledge of the theory and principles applicable to formulating, designing, compounding, and evaluating dosage forms and drug delivery systems. Pharmacy calculations required for compounding and appropriate patient dosing will be examined. The course also introduces the concepts of good manufacturing practice (GMP), quality control, and drug standards including identification of compendia and compendial standards.. Students will learn to apply biopharmaceutical principles to the selection and evaluation of drug products for patient care. The course will emphasize an understanding of the various physiological and drug formulation factors that are involved in absorption and response. The process of drug development and approval including clinical trial descriptions will be discussed. Students will learn the art of medication compounding in a laboratory setting complete with patient profiles, auxillary labels and disruptions from phone-in prescriptions. Rudimentary dispensing, labeling and counseling skills will be utilized while displaying knowledge of the Top 200 prescription medication and popular OTC preparations.</p>
Objectives:	<p>By the end of the course, the student will be able to:</p> <ol style="list-style-type: none">1. identify and apply the pharmaceutical principles involved in designing, formulating, compounding, and evaluating dosage forms and drug delivery systems.2. recognize and describe drug standards, GMP, and quality control for relevant processes.3. demonstrate knowledge of biopharmaceutical principles and the ability to integrate knowledge of biopharmaceutical principles with clinical practice.4. demonstrate the ability to perform calculations involved with compounding and appropriate patient dosing.5. produce a pharmaceutically elegant dosage form from raw materials.6. display knowledge of prescription and OTC medications including the manufacturer, indication, significant side effects and dose.
Director:	Werner Geldenhuys, Ph.D., Pharmaceutical Sciences
Co-Director:	Dale English, Pharm.D., Director of Instructional Laboratories

HPE Coordinator: Pat Nuznoff

Course: Health Information Literacy

Year, Block Offered: Year 1, Block 1

Hours Per Week: 3 hrs every other week x 7 =21 total hrs

Duration in Weeks: 13

Step in Curriculum: 1

Course Description: Students will learn the intended applications of a wide variety of reference materials and gain insight into the appropriate use of such materials in clinical practice. These resources will include tertiary, primary, and Internet sources. The technology used for gathering and disseminating such information is demonstrated. Exercises and assignments will focus on information retrieval techniques, evaluation of tertiary and secondary references, and application of the systematic approach to answering drug information questions.

Objectives: By the end of the course, the student will be able to:

1. describe the drug information and medical resources useful to pharmacists.
2. demonstrate the skills needed for obtaining and disseminating information in response to questions about drugs.
3. use the appropriate technology for gathering and disseminating information about drugs.
4. synthesize clear, concise responses to inquiries of drug properties or clinical use.

Director: Heather McEwen, M.L.I.S., Ocasek Medical Library

Co-Director: Michelle Cudnik, PharmD, Pharmacy Practice

HPE Coordinator: Sue Hricko

Course: Pharmacy and the US Healthcare Delivery System

Year, Block Offered: Year 1, Block 1

Hours Per Week: 3

Duration in Weeks: 13

Step in Curriculum: 1

Course Description: This course introduces students to the many aspects of pharmacy's role in the US Healthcare Delivery System. The student will explore and understand background information, economic factors, settings and situations that they will encounter during their professional career. Topics covered include the history of the US health care system; the impact of Medicaid, Medicare, and private health insurance; pharmacoeconomics and drug policy; mental health pharmacy; pharmaceutical industry; the US Food and Drug Administration; community health centers; public health pharmacy; hospital pharmacy; and community pharmacy.

Objectives: By the end of the course, the student will be able to:

1. describe the organization of the current US health care system, including key historical developments in its evolution and current funding mechanisms (including Medicaid and Medicare).
2. discuss the current structure of the pharmaceutical industry, including federal and state regulatory bodies, drug distribution systems, and the variety of practice settings in which professional pharmacists work.
3. articulate an understanding of basic pharmacoeconomic principles in the current US health care system.

Director: Richard J. Kasmer, Pharm.D., J.D., Pharmaceutical Sciences

Co-Director: Nancy Meyers, Ph.D., RN, CPHQ, Community Health Sciences

HPE Coordinator: LuAnne Stockton

Course: Clinical Research Design

Year, Block Offered: Year 1, Block 1

Hours Per Week: 3

Duration in Weeks: 13

Step in Curriculum: 1

Course Description: Clinical Research Design presents an introduction to clinical study designs and application of descriptive and inferential statistics. The student will develop basic competencies in the design of protocols for pharmaceutical care and outcomes research studies. Students will be required to assess several articles for strengths and weaknesses of design, validity and accuracy of conclusions and clinical relevance. Competencies include: specification of a research question, selection of study design, formulation of hypothesis, descriptive and inferential statistics, clinical trials, and reporting information.

Objectives: By the end of the course, the student will be able to:

1. identify approaches to clinical research design.
2. explain relationship of variables to one another.
3. interpret bivariate and multivariate statistics.
4. apply statistical knowledge to interpret a clinical research article.

Director: Clint W. Snyder, Ph.D., Health Professions Education

Co-Director:

HPE Coordinator: Barb Habowski

Course: Pharmacist Patient Care Experiences I

Year, Block Offered: Year 1, Block 1

Hours Per Week: 4

Duration in Weeks: 13

Step in Curriculum: 1

Course Description: This course is the first of eleven experiential courses that focus on professional skills development for contemporary pharmacy practice. Pharmacy students will learn the basic skills of interviewing and counseling patients, as well as introductions to drug regimen adherence, pharmacy law, community health and population medicine. Interdisciplinary process will be stressed as medical and pharmacy students learn together about medical and medication history-taking, and practice these skills together (medication history for pharmacy students, medical history for medical students) in videotaped encounters with a standardized patient. Pharmacy students will separately learn the basics of medication counseling and patient compliance and practice these skills in supervised role-play exercises as well as videotaped encounters of standardized patients. Groups of mixed medical and pharmacy students will assess an assigned community by completing a scavenger hunt and preparing a poster describing the assessment. Students will also visit an assigned “volunteer patient” to practice assessment and counseling skills in a patient’s home environment.

Objectives: By the end of the course, the student will be able to:

1. recognize the elements of and be able to perform an appropriate medication history.
2. recognize the elements of and be able to perform medication counseling involving an OTC drug.
3. apply knowledge of the incidence and prevalence of disease in a community, whether defined by geograpy, culture, clinical practice, age, or other demographic characteristics.
4. list several community health care agencies, their function, funding and referral patterns in the vicinity of the “volunteer patient”.

Director: Janis J. MacKichan, PharmD, Pharmacy Practice

Co-Director: Louis D. Barone, Pharm.D., Pharmacy Practice

HPE Coordinator: Laurie Zupp

Course: Molecules to Cells

Year, Block Offered: Year 1, Block 2

Hours Per Week: 16

Duration in Weeks: 7

Step in Curriculum: 1

Course Description: This introductory course presents the basic principles and fundamental concepts of biochemistry and genetics in the normal and pathophysiological states: the structure of nucleic acids, amino acids and proteins; the chemical functional groups involved in metabolic pathways; catalysis and inhibition of enzymes; the structure and function of carbohydrates and lipids; and the flow of genetic information and the control of gene expression. The course also focuses on interactions between drugs and receptors and on mechanisms of drug action. When applicable, drug development and intervention in treating diseases are emphasized.

Objectives: By the end of the course, the student will be able to:

1. demonstrate an understanding of the basic biochemical processes in cells and tissues under normal and abnormal physiological states.
2. demonstrate an understanding of these basic biochemical processes as targets for drug action.

Director: Philip Westerman, Ph.D., Microbiology, Immunology and Biochemistry

Co-Director: Richard Carroll, Ph.D., Pharmaceutical Science

HPE Coordinator: Sue Hricko

Course: Evidence Based Medicine

Year, Block Offered: Year 1, Block 2

Hours Per Week: 2

Duration in Weeks: 7

Step in Curriculum: 1

Course Description: This course gives the student an opportunity to apply their knowledge of electronic databases, research design and literature evaluation to answer typical drug information questions. The student will search and analyze the primary, secondary and tertiary literature to synthesize and organize patient care plans. Students will be enabled to actively evaluate the clinical literature and understand the importance of critical analysis of the biomedical literature.

These core principles will be reinforced in clinically-based interdisciplinary conferences through the remainder of the curriculum.

Objectives: By the end of the course, the student will be able to:

1. use search strategies and statistical analysis to identify and critique primary literature.
2. apply clinical pharmacy literature to pharmacy practice and understand the importance of doing so.

Director: Michelle Cudnik, Pharm.D., Pharmacy Practice

Co-Director: Heather McEwen, MLIS, MS

HPE Coordinator: Sue Hricko

Course: Pharmacist Patient Care Experiences II
Focus on Dosage Forms

Year, Block Offered: Year 1, Block 2

Hours Per Week: 6

Duration in Weeks: 7

Step in Curriculum: 1

Course Description: This is the second of eleven courses that focus on professional skills development for contemporary pharmacy practice. In blocks 2-4 of Year 1, pharmacy students will be exposed to 6 different pharmacy practice sites (two sites/block) for three afternoons at each site. These sites must include a chain pharmacy, independent pharmacy, and hospital centralized pharmacy. The remaining three sites may include pharmacies with specialized products or those that serve special populations (e.g., underserved, pediatrics, veterinary). Activities at the site will allow students to see and work with drugs and drug formulations, develop an understanding of pharmacy technician roles, and understand aspects of pharmacy law as they impact different practices. Written assignments and activities are designed to build on didactic material presented in courses from the preceding block. In block 2, students will participate in small group discussions of case studies that require use of the pharmacy literature and pharmaceutical calculations to answer drug formulation questions. They will also complete a response to a drug information question (generated during one of the site visits) as part of their grade for the Evidence Based Medicine course. Students will continue to practice medication history and counseling skills using standardized patients as well as visits to their assigned volunteer patient. Students will use online resources to study medical terminology and learn the Top 200 prescription drugs.

Objectives: By the end of the course, the student will be able to:

1. apply pharmacy calculations to problems in pharmacy practice settings.
2. understand how pharmacy law impacts various pharmacy settings.
3. explain the advantages of various drug formulations from a patient's perspective.
4. understand the pharmacy technician's role in a variety of practice settings.
5. apply information searching techniques to formulate the answer to a drug information question.
6. list the generic name, trade name, and therapeutic category of the Top 50 prescription drugs.
7. know the pronunciation and definitions of common medical terms

Director: Janis J. MacKichan, PharmD, Pharmacy Practice

Co-Director: Louis D. Barone, Pharm.D., Pharmacy Practice

HPE Coordinator: Laurie Zupp

Course: Physiologic Basis of Medicine

Year, Block Offered: Year 1, Block 3

Hours Per Week: 16

Duration in Weeks: 7

Step in Curriculum: 2

Course Description: This course covers the physiological functions of the human body at the molecular, cellular, organ, and organ system levels, with emphasis on the ways in which the body's integration and regulation at all of these levels results in homeostasis or disease states. Additionally, the course introduces students to the primary disease processes that disrupt normal body function. The main emphasis in this course will be on the cardiovascular, pulmonary, gastrointestinal, and renal systems. This knowledge base will serve as a foundation for later courses in pharmacology and pharmacotherapeutics.

Objectives: By the end of the course, the student will be able to:

1. demonstrate an understanding of the functions of the human body at the molecular, cellular, organ, and organ system level.
2. discuss the normal function of and the pathophysiological processes affecting the cardiovascular, pulmonary, gastrointestinal, and renal systems.
3. explain how drugs affect organ systems.

Director: Charles Pilati, Ph.D., Physiology and Pharmacology

Co-Director: Janis J. MacKichan, Pharm.D., Pharmacy Practice

HPE Coordinator: Sue Hricko

Course: Parenteral Products with Laboratory

Year, Block Offered: Year 1, Block 3

Hours Per Week: 3

Duration in Weeks: 7

Step in Curriculum: 2

Course Description: This course is designed to understand and critique parenteral medication orders and to convert complex therapeutic infusion orders into finished products. Accurate calculation of parenteral ingredients, chemical interactions and stabilities will be stressed. Students will learn sterile techniques and safety precautions for compounding piggyback medications, large volume parenterals, parenteral nutrition and sterile irrigation solutions. Special emphasis will be placed on reconstituting chemotherapy agents. Students will learn the importance of in-line filters, specialized infusion tubing and shielding specific fluids from sunlight. Technology will be introduced through the use of specialized pumps for compounding parenteral nutrition solutions, infusion pumps for administering intravenous medication and mobile pumps for infusing pain medication or chemotherapy. Students will be introduced to specialized infusion lines such as the central line, PIC lines, infusion ports, and peripheral catheters. Students will learn about new standards for managing a sterile products area as well as current OSHA standards for employee and patient safety.

Objectives: By the end of the course, the student will be able to:

1. demonstrate ability to calculate and mix ingredients of complex parenteral solution orders.
2. demonstrate expert sterile technique when preparing an IV admixture.
3. discuss the use of pumps, filters, infusion tubing and routes of administration.
4. use standard references to determine compatibilities and infusion techniques for standard medications.

Director: Dale English, Director of Instructional Laboratories

Co-Director: Robb McGory, Pharm.D, Pharmacy Practice

HPE Coordinator: Pat Nuznoff

Course: Pharmacist Patient Care Experiences III
Focus on Dosage Forms

Year, Block Offered: Year 1, Block 3

Hours Per Week: 5

Duration in Weeks: 7

Step in Curriculum: 2

Course Description: This is the third of eleven courses that focus on professional skills development for contemporary pharmacy practice. In blocks 2-4 of Year 1, pharmacy students will be exposed to 6 different pharmacy practice sites (two sites/block) for three afternoons at each site. These sites must include a chain pharmacy, independent pharmacy, and hospital centralized pharmacy. The remaining three sites may include pharmacies with specialized products or those that serve special populations (e.g., underserved, pediatrics, veterinary). Activities at the site will allow students to see and work with drugs and drug formulations, develop an understanding of pharmacy technician roles, and understand aspects of pharmacy law as they impact different practices. Written assignments and activities are designed to build on didactic material presented in courses from the preceding block. Activities unique to block 3 include interviewing a preceptor about the health care system and participation in journal club discussions and presentations. As in block 2, students will continue to practice medication history and OTC counseling skills using standardized patients, formulate the answer to a drug information question, evaluate drug formulation differences, and study medical terminology and the Top 200 prescription drugs.

Objectives: By the end of the course the student will be able to:

1. apply pharmacy calculations to problems in pharmacy practice settings.
2. understand the challenges of the health care system from a pharmacists' perspectives.
3. explain the advantages of various drug formulations from a patient's perspective.
4. understand the pharmacy technician's role in a

- variety of practice settings.
5. apply information searching techniques to formulate the answer to a drug information question.
 6. list the generic name, trade name, and therapeutic category of the Top 100 prescription drugs.
 7. know the pronunciation and definitions of common medical terms

Director: Janis J. MacKichan, PharmD, Pharmacy Practice
Co-Director: Louis D. Barone, Pharm.D., Pharmacy Practice
HPE Coordinator: Laurie Zupp

Course: Brain, Mind and Behavior

Year, Block Offered: Year 1, Block 4

Hours Per Week: 16

Duration in Weeks: 8

Step in Curriculum: 2

Course Description: This course introduces students to the anatomy, embryology and physiology of the brain. The central and peripheral nervous systems will be studied to understand the stimulation, transmission and interpretation of sensory organs. The function of specialized sensory systems including sight, smell, taste, sound and balance will be discussed in detail. The effect of aging and disorders involving anatomic structure or CNS circulation will be correlated with clinical disease. An in depth understanding of the neurological communication pathways will allow the prediction of neurological deficits based upon the anatomic structure that is malfunctioning. Understanding the neurological pathways and neurohormonal communication will give insight into seizures and psychiatric illness. The comprehension of anatomy, neuronal communication and effector systems will prepare the student for therapeutic intervention that will be discussed in future classes.

Objectives: By the end of the course the student will be able to:

1. demonstrate an understanding of the anatomy and physiology of the central and peripheral nervous system and its relationship to human behavior.
2. predict neurological deficits based upon anatomical lesions in the tissue or blood supply of the brain.
3. demonstrate an understanding of the pathophysiology of the central and peripheral nervous systems, including mental health disorders.
4. identify drug-targeting points in the nervous system.

Director: Raymond Papka, Ph.D., Neurobiology

Co-Director: Cornelis Van der Schyf, Ph.D., Pharmaceutical

HPE Coordinator: Sciences

Sue Hricko

Course:	Pharmacist Patient Care Experiences IV Dosage Forms
Year, Block Offered:	Year 1, Block 4
Hours Per Week:	8
Duration in Weeks:	8
Step in Curriculum:	2
Course Description:	<p>This is the fourth of eleven courses that focus on professional skills development for contemporary pharmacy practice. In blocks 2-4 of Year 1, pharmacy students will be exposed to 6 different pharmacy practice sites (two sites/block) for three afternoons at each site. These sites must include a chain pharmacy, independent pharmacy, and hospital centralized pharmacy. The remaining three sites may include pharmacies with specialized products or those that serve special populations (e.g., underserved, pediatrics, veterinary). Activities at the site will allow students to see and work with drugs and drug formulations, develop an understanding of pharmacy technician roles, and understand aspects of pharmacy law as they impact different practices. Written assignments and activities are designed to build on didactic material presented in courses from the preceding block. Activities unique to block 4 include participation in small group discussions of case studies that require use of the pharmacy literature and pharmaceutical calculations to answer questions about parenteral drug formulations. There will also be an interdisciplinary patient care exercise: medical and pharmacy students will see a standardized patient together with each doing their assigned activities (pharmacy student does medication history, vital signs, OTC counseling; medical student does medical history, physical exam, and prescribes OTC drug.) Pharmacy students will continue to practice medication history, vital signs measurements, and OTC counseling skills using standardized patients, formulate the answer to a drug information question, present a journal club, evaluate drug formulation differences, and study medical terminology and the Top 200 prescription</p>

drugs.

Objectives:

By the end of the course, the student will be able to:

1. apply pharmacy calculations to problems in pharmacy practice settings.
2. explain the advantages of various drug formulations from a patient's perspective.
3. understand the pharmacy technician's role in a variety of practice settings.
4. apply information searching techniques to formulate the answer to a drug information question.
5. work effectively with physician colleagues during patient encounters.
6. list the generic name, trade name, and therapeutic category of the Top 200 prescription drugs.
7. know the pronunciation and definitions of common medical terms

Director:

Janis J. MacKichan, PharmD, Pharmacy Practice

Co-Director:

Louis D. Barone, Pharm.D., Pharmacy Practice

HPE Coordinator:

Laurie Zupp