

SCHOOL OF MEDICINE

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Programs

- Biomedical Research, M.D./Ph.D. (<http://catalog.marshall.edu/graduate/programs-az/medicine/biomedical-research-md-phd/>)
- Biomedical Research, M.S. (Non-Thesis) (<http://catalog.marshall.edu/graduate/programs-az/medicine/biomedical-research-ms-non-thesis/>)
- Biomedical Research, M.S. (Thesis) (<http://catalog.marshall.edu/graduate/programs-az/medicine/biomedical-research-ms-thesis/>)
- Biomedical Research, M.S. and Pharm.D. (<http://catalog.marshall.edu/graduate/programs-az/medicine/biomedical-research-ms-pharmd/>)
- Biomedical Research, Ph.D. (<http://catalog.marshall.edu/graduate/programs-az/medicine/biomedical-research-phd/>)
- Clinical and Translational Science M.S. (<http://catalog.marshall.edu/graduate/programs-az/medicine/clinical-translational-science-ms/>)
- Physician Assistant, M.S. (<http://catalog.marshall.edu/graduate/programs-az/medicine/physician-assistant/>)

Courses

Biomedical Research

BMR 601 Intro DNA, RNA & Proteins 3 Credit hours
A molecular and cell biological study of the structure and function of nucleic acids and proteins.

Grade Mode: Normal Grading Mode

BMR 602 Intro Cells and Metabolism 3 Credit hours
A molecular and cell biological study of the structure of cells and of cellular metabolism.

Grade Mode: Normal Grading Mode

BMR 603 Regulation Cell Function 2 Credit hours
An advanced molecular and cell biological study of cell metabolism and the regulation of cell function.

Grade Mode: Normal Grading Mode

BMR 604 Cell Basis of Disease 1 Credit hour
A molecular and cell biological study of the basis of diseases prevalent in Appalachia

Grade Mode: Normal Grading Mode

BMR 617 BMR Statistics Technique 3 Credit hours
An application-oriented course in statistical concepts and techniques aimed at prospective researchers in the biomedical sciences.

Grade Mode: Normal Grading Mode

BMR 628 Neuroscience I 3 Credit hours
To study and understand the structure and function of the nervous system and disorders of neuronal function.

Pre-req: BMR 600.

Grade Mode: Normal Grading Mode

BMR 629 Neuroscience II 3 Credit hours

To study and understand the structure and function of the nervous system and disorders of neuronal function.

Pre-req: BMR 628.

Grade Mode: Normal Grading Mode

BMR 631 Neurosci/DevBio Lit Review 1 Credit hour

Published articles in the neuroscience literature will be presented by all class members. Each presentation will include background introduction methods, results, and discussion of the neuroscience research.

Grade Mode: Credit/No Credit Grade Only

BMR 641 Molecular Development 3 Credit hours

An in-depth discussion of current literature in developmental biology with emphasis on early embryo development, morphogenesis, lineage determination and regulation of developmental process.

Pre-req: BIC 628.

Grade Mode: Normal Grading Mode

BMR 644 Research Conduct 1 Credit hour

Responsible conduct of research, including human subjects, live vertebrate animals, conflict of interest, mentor-mentee responsibilities, collaborative research, peer review, data management, research misconduct, and responsible authorship, with case discussions.

Grade Mode: Credit/No Credit Grade Only

BMR 651 Cancer Biology 4 Credit hours

An advanced graduate course on the core principles of initiation, progression, treatment and prevention of cancer, based on current literature. (PR: BMR 601, 602, 603, 604, and permission of instructor).

Pre-req: BMR 601 and BMR 602 and BMR 603 and BMR 604.

Grade Mode: Normal Grading Mode

BMR 652 Cancer Biol Colloquium 1 Credit hour

This is a mentored journal club for graduate students covering selected areas of current interest in cancer biology research.

Grade Mode: Credit/No Credit Grade Only

BMR 660 Communication Bio Sci I 1 Credit hour

Biomedical graduate students are trained to plan, prepare and deliver effective scientific presentations.

Grade Mode: Credit/No Credit Grade Only

BMR 661 Communication Bio Sci II 1 Credit hour

Biomedical graduate students are trained to plan, prepare and deliver effective scientific presentations.

Grade Mode: Credit/No Credit Grade Only

BMR 664 ORDRC Colloquium 1 Credit hour

A seminar course where published articles in the field of obesity and obesity-related diseases are presented and discussed.

Grade Mode: Credit/No Credit Grade Only

BMR 665 CDRC Colloquium 1 Credit hour

A seminar-style series that will focus on recent advances in topics related to cardiovascular disease.

Grade Mode: Credit/No Credit Grade Only

BMR 674 Teaching Practicum 1 Credit hour

Students gain experience in teaching using a variety of methods in a supervised setting.

Grade Mode: Credit/No Credit Grade Only

BMR 676 CBR Journal Club 1 Credit hour

Mentored journal club preparation with monthly presentation in cellular and molecular biology research.

Grade Mode: Normal Grading Mode

BMR 679 Special Problems	1 Credit hour	CTS 616 Intro Clinical Program C#	3 Credit hours
Intensive study of a selected topic or problem. Emphasizes independent study.		Course will present C#, a tool that can be used to manipulate data within the Clinical database using LINQ/other to connect the application to the database. The focus is on translational research, which is concerned with bringing bioscience research discoveries into patient care. This course is designed for those who are interested in medical research programming using console/web/smart-phone application technology.	
Grade Mode: Credit/No Credit Grade Only		Grade Mode: Normal Grading Mode	
BMR 680 Seminar	1 Credit hour	CTS 620 Basic Research Operations	3 Credit hours
Study and discussion of current topics related to the Biomedical Sciences.		This course will focus on the operation of clinical research trials, providing an overview of the critical aspects involved in all stages of clinical trials.	
Grade Mode: Credit/No Credit Grade Only		Grade Mode: Normal Grading Mode	
BMR 681 Thesis	1-6 Credit hours	CTS 625 Clinical Operations Lab	1-6 Credit hours
Grade Mode: Credit/No Credit Grade Only		This course is a hands on experience in Clinical Research trial operation. The course provides an opportunity for students to work with clinical research professionals on FDA-directed clinical trials.	
BMR 785 Intro to Research	1-6 Credit hours	Pre-req: CTS 620.	
Directed research activities requiring a completed prospectus for an advanced research project, a written report, or a research thesis. A minimum of three (3) hours required for all M.S. candidates.		Grade Mode: Credit/No Credit Grade Only	
Grade Mode: Credit/No Credit Grade Only		CTS 628 Intro to Java Cln Prog	4 Credit hours
BMR 882 Research	1-15 Credit hours	The goal of this course is to expose clinical informatics students to programming in Java for common problem solving tasks. This course will focus on topics related to object-oriented programming with emphasis on object oriented design and style, classes, recursion, searching and sorting, simple data structures, and graphical user interfaces.	
Grade Mode: Credit/No Credit Grade Only		Grade Mode: Normal Grading Mode	
Clinical Translational Science			
CTS 600 Epi Used in Med Research	3 Credit hours	CTS 630 Fundamentals of Team Science	2 Credit hours
Practical application of epidemiology and biostatistics used in medical research. The course will primarily focus on the design and analysis of translational studies.		This course offers practical guidance about how best to engage in team science to pursue complex science questions and work effectively with team members.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
CTS 610 Study Design & Stats	3 Credit hours	CTS 632 Qualitative Research	1 Credit hour
Students will participate in an internship with faculty in providing consultation services in study design and statistics for medical research projects.		This course is designed as an introduction to qualitative research methods. It offers various approaches to designing and conducting qualitative research projects in health and health services research. Students will gain hands-on experience in various qualitative methods and analysis techniques while carrying out a research project related to their area of interest.	
Grade Mode: Normal Grading Mode		Grade Mode: Credit/No Credit Grade Only	
CTS 611 Machine Learn Journal Club	1 Credit hour	CTS 635 Writing and Peer Review	1 Credit hour
Articles that describe either clinical or translational research along with machine learning techniques will be discussed. Students are expected to read, describe and present at these fourteen, 1 hour weekly sessions.		This course teaches students to become more effective writers of scientific publications.	
Grade Mode: Credit/No Credit Grade Only		Grade Mode: Normal Grading Mode	
CTS 612 Intro Clin Machine Learn	3 Credit hours	CTS 637 Introduction to Tableau	3 Credit hours
This course is designed for those who are interested in using machine learning with a focus on translational medical research, which is concerned with bringing bioscience research discoveries into patient care. This course explores the characteristic of its methods, its benefits and limitations. Explain and describe different learning algorithm machine learning journal club is optional.		Tableau is a business/clinical intelligence tool that makes it easier to process an ever-increasing stream of clinical information through data visualization, data discovery, visual analytics, dashboards, and visual storytelling. In this course, students will learn the fundamentals of creating interactive visual displays using an industry standard visualization tool using real medical data.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
CTS 614 Online Survey Tools	3 Credit hours	CTS 640 Clinical Trials Journal Club	1 Credit hour
This course will introduce Redcap, explore relational DB terms, I2B2, a research data warehouse counting tool, and data manipulation using MS SQL queries, functions, procedures along with C# using LINQ.		This course will be presentations and discussions of the recent literature in the area of clinical trials. Fundamental principles and new discoveries will be emphasized.	
Grade Mode: Normal Grading Mode		Grade Mode: Credit/No Credit Grade Only	
CTS 615 Intro Clinical Databases	3 Credit hours		
This course is an introduction to the concepts of database processing and management especially as it relates to clinical translational research. The focus is to bring bioscience research discoveries into patient care. Primary topics include discussions of major database types, history of databases and database issues, security, database principles, DBMS, RDBMS, SQL queries, Big Data, Marshall Clinical Data Warehouse.			
Grade Mode: Normal Grading Mode			

CTS 645 Navigating Health IT	3 Credit hours	MCB 660 Diagnostic Virology	3 Credit hours
The quality of healthcare data is critical to clinical & translational research and medical practice. Getting the right data is difficult without a basic understanding of health information systems (HIS) and medical classification standards. This course provides an overview of these HIS and standards in the healthcare industry and enables gathering and use of HIS data effectively.		A comprehensive survey of methodologies used to detect and characterize viral specific antibodies and antigens and the status of cellular immunity in virus infected hosts.	
Grade Mode: Normal Grading Mode		Pre-req: MCB 620.	
CTS 650 Rural Clinical Experience	5 Credit hours	Grade Mode: Normal Grading Mode	
This course will acquaint students with the issues of rural community health and wellness, which will allow them to participate in clinical studies in a rural environment.		MCB 675 Special Topics	1-4 Credit hours
Pre-req: CTS 620.		Grade Mode: Normal Grading Mode	
Grade Mode: Credit/No Credit Grade Only		MCB 676 Special Topics	1-4 Credit hours
CTS 660 Appalachian Phenotype	3 Credit hours	Grade Mode: Normal Grading Mode	
The course will describe the clinical presentations, epidemiology and molecular phenotype of disorders common in the Appalachian region.		MCB 677 Special Topics	1-4 Credit hours
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
Microbiology		MCB 679 Special Problems	1-3 Credit hours
MCB 620 Prin Medical Microbiology	6 Credit hours	Grade Mode: Normal Grading Mode	
The study of microorganisms, immunobiology, immunologic diseases, host resistance and the means by which diseases are produced and prevented.		MCB 720 Microbiology	6 Credit hours
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
MCB 622 Curr Topics Molec Biology	1 Credit hour	MCB 743 Principles of Immunology	3 Credit hours
Critical discussion of current literature/concepts. Participants present published research papers on topics with a molecular biology component. Presentations are followed by discussion/evaluation of the contribution of the research.		Basic principles of the immune response system of humans and related mammalian representatives. The concepts of B and T cell function and their interrelationships will be emphasized.	
Grade Mode: Credit/No Credit Grade Only		Grade Mode: Normal Grading Mode	
MCB 631 Medical Microbiology I	3 Credit hours	MCB 780 Elective Special Projects	1 Credit hour
This course will present the major aspects of the field of medical microbiology with emphasis on selected pathogenic organisms.		Grade Mode: Normal Grading Mode	
Pre-req: BMS 600.		MCB 785 Independent Study	1-15 Credit hours
Grade Mode: Normal Grading Mode		Independent Study in Microbiology is designed to allow the student the opportunity to work with a faculty member on a topic of special interest.	
MCB 632 Medical Microbiology II	2 Credit hours	Grade Mode: Credit/No Credit Grade Only	
This course will present a continuation of the major aspects of the field of medical microbiology with emphasis on the major pathogenic organisms.		MCB 813 Research in Microbiology	1-18 Credit hours
Pre-req: BMS 600 and MCB 631.		Grade Mode: Normal Grading Mode	
Grade Mode: Normal Grading Mode		MCB 814 Clin Lab Microbiol Immun	1-18 Credit hours
MCB 642 Graduate Microbiology I	4 Credit hours	Grade Mode: Normal Grading Mode	
An advanced treatment of microbiology with emphasis on the molecular aspects of anatomy, taxonomy, and physiology and genetics of microorganisms.		Pharmacology	
Grade Mode: Normal Grading Mode		PMC 610 Intro Pharmacology	3 Credit hours
MCB 643 Principles of Immunology	3 Credit hours	Grade Mode: Normal Grading Mode	
Basic principles of the immune response system of humans and related mammals. Concepts of B & T cell function and inter-relationships emphasized.		PMC 615 Pharmacology Reviews	1 Credit hour
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
MCB 648 Molec Aspects of Pathogenesis	3 Credit hours	PMC 620 Medical Pharmacology	8 Credit hours
An in depth study of molecular mechanisms of bacterial, viral, and immune-mediated disease processes.		An introduction to the basic concepts of drug actions and therapeutic principles governing drug therapy. Emphasis is placed on general mechanisms, therapeutic uses and toxicity of prototypic drugs.	
Grade Mode: Normal Grading Mode		Pre-req: BIC 620.	
		Grade Mode: Normal Grading Mode	
		PMC 621 Medical Pharmacology I	6 Credit hours
		This course will encompass the core pharmacology concepts as well as drugs used in the treatment of infectious diseases, cancer, hematological matters, nervous system agents and cardiovascular drugs.	
		Pre-req: BMS 600.	
		Grade Mode: Normal Grading Mode	

PMC 622 Medical Pharmacology II	2 Credit hours	PMC 676 Special Topics	1-4 Credit hours
This course will encompass the core pharmacology concepts as well as drugs used in the treatment of pulmonary, gastrointestinal, endocrine, renal, and musculoskeletal diseases, drugs specific for mens and womens health, dermatological agents, and toxicology.		Grade Mode: Normal Grading Mode	
Pre-req: BMS 600.		PMC 677 Special Topics	1-4 Credit hours
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PMC 625 Drug Metabolism	3 Credit hours	PMC 720 Medical Pharmacology	8 Credit hours
Topics will include a discussion of the metabolizing enzymes, enzyme induction and inhibition, toxic metabolites, prodrugs, metabolic disorders and analytical methods for studying drug metabolism.		Grade Mode: Normal Grading Mode	
Grade Mode: Normal Grading Mode		PMC 780 Elective Special Projects	1 Credit hour
PMC 630 Chem Aspects Pharmacology	3 Credit hours	Grade Mode: Normal Grading Mode	
An introduction to the chemical principles of pharmacology. The chemical classification, acid-base chemistry and stereo- chemical properties of drugs and the reactivity of drugs with biological systmes will be discussed.		PMC 785 Clinical Pharmacology	1-18 Credit hours
Grade Mode: Normal Grading Mode		Independent Study of Pharmacology	
PMC 633 Vistas in Pharmacology	3 Credit hours	Grade Mode: Pass/Fail Grading Mode	
Pre-req: PMC 620.		PMC 868 PMC Externship	1-18 Credit hours
Grade Mode: Normal Grading Mode		Out-of-State Externship	
PMC 635 Neuropharmacology	3 Credit hours	Grade Mode: Pass/Fail Grading Mode	
A study of the actions of drugs on the nervous system.			
Pre-req: BMS 600.		Pharmacy	
Grade Mode: Normal Grading Mode		PHAR 511 Clinical Immunology	1 Credit hour
PMC 639 Neuropharm Res Tech	3 Credit hours	Skills development in vaccine administration, patient counseling, and maintaining appropriate record management. The student will acquire knowledge regarding individual vaccines and the vaccination process. This knowledge will be reinforced through laboratory and simulation activities. Skill development will culminate with the student providing immunizations in patient settings.	
Class participants will be exposed to state-of-the-art neuropharmacology research techniques while in the labor- atories of neuropharmacology faculty.		Grade Mode: Normal Grading Mode	
Grade Mode: Credit/No Credit Grade Only		PHAR 521 Integrated Laboratory I	2 Credit hours
PMC 640 Behavioral Pharmacology	3 Credit hours	This is a laboratory course to provide hands-on experience that complements didactic presentations in PHAR 531 and PHAR 532.	
Behavioral methods for assaying drug action.		Pre-req: PHAR 531.	
Pre-req: PMC 635.		Co-req: PHAR 532	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PMC 643 Intro Cardiopulmonary Pharm	3 Credit hours	PHAR 522 Fund Med Chem	2 Credit hours
A general overview of the principles of pharmacology and the mechanisms and effects of cardiovascular and respiratory drugs.		An introductory course providing the fundamental basics of drug action. Specifically, the course will cover the physicochemical properties of drugs, basic principles of medical chemistry and structure activity relationships, including drug-receptor interactions, theories of drug action and drug metabolism.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PMC 645 Adv Cardiopulmonary Pharm	3 Credit hours	PHAR 531 Biopharmaceutics I	3 Credit hours
An indepth presentation of pharmacological aspects of cardiovascular and pulmonary systems. Current knowledge, principles and methods used in cardiopulmonary research will be discussed.		Topics covered include the physicochemical principles of pharmacy, such as acid-base theory, solubility, physical states of drugs, thermodynamics, drug stability, excipients, surfactants, dispersions, polymers, drug delivery, chemical compatibility and interactions of drugs in various dosage forms.	
Pre-req: PMC 620 or PMC 643.		Grade Mode: Normal Grading Mode	
Grade Mode: Normal Grading Mode		PHAR 532 Biopharmaceutics II	3 Credit hours
PMC 650 General Toxicology	3 Credit hours	Topics covered include mechanisms of both immediate and sustained drug release in formulations involving solid and semi-solid systems; introduction to novel drug delivery systems; drug pre-formulation, the drug approval processes, and regulations governing the pharmaceutical industry; drug preparation, liberation, absorption and stability dosage.	
Pre-req: PMC 620.		Pre-req: PHAR 531.	
Grade Mode: Normal Grading Mode		Co-req: PHAR 521	
PMC 655 Toxicology Reviews	1 Credit hour	Grade Mode: Normal Grading Mode	
This course will provide a presentation and discussion of current literature in the area of toxicology. Fundamental principles and new discoveries will be emphasized.			
Grade Mode: Normal Grading Mode			
PMC 675 Special Topics	1-4 Credit hours		
Present course material on special areas of research or topics which are not routinely covered in esisting courses.			
Grade Mode: Normal Grading Mode			

- PHAR 541 Pharmacy Practice I** **4 Credit hours**
Begin professional development understanding the responsibilities of a registered pharmacist providing patient care. Professional conduct, personnel management, personal conduct, pharmacy calculations, immunizations, legal issues, and team dynamics are stressed.
Grade Mode: Normal Grading Mode
- PHAR 542 Immunology and Microbiology** **4 Credit hours**
Topics covered include an introduction to the classification, morphology and physiology of microorganisms, primarily organisms that can cause human pathology, such as bacteria, viruses, fungi, protozoans, parasites, and worms; the body's immune response and mechanisms of defense at the cellular and humoral (molecular) level will also be covered in the context of pathogenic organisms, tissue transplants, and autoimmune disease.
Grade Mode: Normal Grading Mode
- PHAR 543 Pharmacy Practice II** **4 Credit hours**
Continued professional development of the pharmacy practitioner. Sterile products, top 200 medications, laboratory values, SOAP notes, documentation, medication safety, patient counseling and technology, communication, and public service are stressed.
Pre-req: PHAR 541.
Grade Mode: Normal Grading Mode
- PHAR 544 Prin of Disease & Drug Action** **4 Credit hours**
Topics covered include the concepts and mechanisms of the basic processes underlying disease and pathophysiology; the general principles underlying drug action and therapeutics, including receptor pharmacology, enzyme inhibition and pharmacology; the relationship between drug concentration at the target tissue and drug effect; and concepts in pharmacogenomics and pharmaceutical genetics as they relate to drug action, and individual variation in response to drug action, nutrition, and biochemical processes.
Grade Mode: Normal Grading Mode
- PHAR 545 Therapeutics I** **4 Credit hours**
Students will learn about the therapeutic use, human physiology, pharmacologic and chemical properties of over-the-counter medication and non-medication interventions for both prevention and prevention of disease.
Pre-req: PHAR 541.
Grade Mode: Normal Grading Mode
- PHAR 546 Pharmaceutical Biochemistry** **4 Credit hours**
This course is designed to provide biochemistry fundamentals to PharmD students. Topics covered include structures and properties of water and biomolecules (proteins, lipids, and nucleic acids), enzymes and enzyme kinetics, membranes, receptors, transporters, signaling, human metabolism, hormonal regulation of metabolism, and basics of genomics, gene regulation, and proteins synthesis. Examples of basic principles covered in this class will be illustrated by use of the top 200 drugs.
Grade Mode: Normal Grading Mode
- PHAR 611 Integrated Laboratory II** **1 Credit hour**
Practical hands-on experience in modern scientific methods used in biochemistry, pharmaceuticals, pharmacology, pharmacometrics; and analytical methods employed to detect, characterize, and quantitate naturally occurring substances and drug molecules.
Grade Mode: Normal Grading Mode
- PHAR 612 Therapeutic Drug Dosing** **1 Credit hour**
Application of the basic principles of pharmacokinetics and pharmacodynamics to practice settings. Simulation and case-based methods are used to allow integration of pharmacy practice and skills learned during the PHAR 631 course.
Grade Mode: Normal Grading Mode
- PHAR 621 Pharmacy Law & Ethics** **2 Credit hours**
An applied analysis of federal and West Virginia state law and ethical standards in the practice of Pharmacy and Pharmaceutical Care.
Grade Mode: Normal Grading Mode
- PHAR 622 Drug Info & Comm Skills** **2 Credit hours**
Topics covered include basic skills in obtaining and utilizing drug information references, and foundational skills required in patient counseling, such as, the Indian health method of counseling.
Grade Mode: Normal Grading Mode
- PHAR 631 Pharmacometrics** **3 Credit hours**
Topics covered include the basic theory of pharmacokinetics and pharmacodynamics; process and mechanisms controlling the rate and extent of drug absorption and systemic availability; bioavailability and bioequivalence.
Grade Mode: Normal Grading Mode
- PHAR 632 PPM Leadership** **3 Credit hours**
Provides students with a working knowledge of important and fundamental aspects of pharmacy practice leadership including, but not limited to: management, strategic planning, motivational theories, and employment issues.
Grade Mode: Normal Grading Mode
- PHAR 633 Patient Care Skills Lab** **3 Credit hours**
Application of physical assessment, triage, patient counseling, and communication skills. Assessment of individual patient, acuity, responsible therapeutic plan, documentation, conflict resolution, and team building are stressed.
Grade Mode: Normal Grading Mode
- PHAR 634 PPM Finance** **3 Credit hours**
The contemporary practice of pharmacy in the healthcare system as it fits into the business environment. Healthcare systems, pharmacoeconomics, planning, evaluating, and decision-making through financial report analysis/case study are stressed.
Grade Mode: Normal Grading Mode
- PHAR 635 Research Outcomes Patient Care** **3 Credit hours**
The fundamentals of clinical and outcomes research will be discussed and applied to patient care. Students will gain an understanding of study design, research methods, statistical analysis, and pharmacotherapy.
Grade Mode: Normal Grading Mode
- PHAR 661 Therapeutics II** **6 Credit hours**
This course discusses clinical microbiology and principles of anti-infective therapy as well as the pathophysiology, associated pharmacology, and therapeutic approaches to infectious diseases and conditions of the integumentary system.
Grade Mode: Normal Grading Mode
- PHAR 671 Therapeutics III** **7 Credit hours**
Students will learn about the therapeutic use of medication and non-medication interventions for both treatment and prevention of cardiovascular diseases, renal diseases, pulmonary diseases, and associated electrolyte disorders.
Grade Mode: Normal Grading Mode

PHAR 711 Med Therapy Management	1 Credit hour	PHAR 781 Veterinary Pharmacy	3 Credit hours
The student will learn to resolve medication-related problems to reduce costs and improve outcomes.		To instruct students in the administration, clinical pharmacology, clinical applications, diseases, medication safety and comparative dosing of veterinary medications that a pharmacist may encounter in the community pharmacy setting.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PHAR 712 Capstone Diabetes Care	1 Credit hour	PHAR 801 Special Topics I	1-6 Credit hours
Diabetes care capstone.		An opportunity for individual students to gain advanced experiences in practice, research, or service. Students will identify mentor and jointly develop individualized learning outcomes and a learning plan.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PHAR 721 Therapeutics 7	2 Credit hours	PHAR 802 Special Topics II	1-6 Credit hours
This course will emphasize the unique needs and differences in therapeutic recommendations for patients at the extremes of ages, diverse cultural backgrounds, and those with co-morbidities and other health conditions.		An opportunity for students to didactically explore advanced topics within the profession of pharmacy.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PHAR 722 PPM Patient Safety	2 Credit hours	PHAR 811 Pharm Prac Exp I (IPPE 1)	1 Credit hour
Further professional development in the management of patient safety policies and procedures. Areas covered include: robotics, medication reconciliation, discharge planning, risk management, and other methods of improving patient safety.		Introduction to community pharmacy practice in a supervised setting.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PHAR 731 Case Studies	3 Credit hours	PHAR 812 Pharm Prac Exp II (IPPE II)	1 Credit hour
Students will apply the principles of patient care, practice management, and public health to drug therapy issues through student-centered, problem-based instructional processes.		Introduction to community pharmacy practice in a supervised setting. Students are exposed to the role and responsibilities of the community pharmacist; including effective communication, and application of laws governing pharmacy.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PHAR 732 Clin Aspects Rx Meds	3 Credit hours	PHAR 813 IPPE 3 Community 2	1 Credit hour
A discussion of the clinical aspects of medications will be covered with an emphasis on 1) pharmaceutical calculations and 2) analysis of the differences between various drugs and drug classes.		Builds on the foundation of the Community Pharmacy 1 experience. The student will demonstrate critical thinking and problem solving skills, topical compounding skills, and professional attitude and behaviors.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PHAR 733 Residency Preparation	3 Credit hours	PHAR 814 Intro Phar Institutions 2	1 Credit hour
This course will help to prepare the pharmacy student for completion of postgraduate training, exploring processes including research project design and execution, interviewing, residency applications, and professional development.		Builds on the foundations of the Institutional Pharmacy 1 Experience. The student will demonstrate critical thinking and problem solving, document professional practice activities, and parenteral compounding abilities.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PHAR 734 Medications of Abuse	3 Credit hours	PHAR 815 Phar Prac Exp 5 IPPE 5	1 Credit hour
This course discusses medications of abuse and their impact on society, reviews the history of substance use disorder relating them to current affairs and the impact on society.		Introduces pharmacist student to the ambulatory care setting. Student will demonstrate the ability to develop a therapeutic plan that includes the selection of appropriate drug therapy based on patient characteristics.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PHAR 741 Ther-Endocrine	4 Credit hours	PHAR 816 Inpatient Clinical Skills	1 Credit hour
Students will learn about the therapeutic use of medication and non-medication interventions for reproduction, and treatment and prevention of endocrine and genitourinary diseases.		Introduces the pharmacy student to the clinical skills in an institutional setting needed to be successful. Student will demonstrate appropriate drug dosing and drug selection based on patient characteristics.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PHAR 751 Neuro & Psychiatric Dis	5 Credit hours	PHAR 817 Intro Phar Prac Exp IPPE 7	1 Credit hour
Students will learn treatment and prevention of neurological and psychiatric diseases including the physiology, pathophysiology, pharmacology and therapy. This course emphasizes the pharmacist as a health care provider.		Students are exposed to the role and responsibilities of a pharmacy team leader, manager, or director and the application of management strategy, tools, and responsibilities.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	
PHAR 761 HemeOnc Nutrition Hepa MS	6 Credit hours	PHAR 818 Education IPPE 8	1 Credit hour
Students will learn treatment/prevention of heme-onc, nutrition, hepatic and musculoskeletal diseases including the pathophysiology, pharmacology and therapy. This course emphasizes the pharmacist as a health care provider.		The Pharmacist Student will develop and present continuing education programs or active learning exercises, apply instructional as well as learning techniques, and demonstrate mentoring skills.	
Grade Mode: Normal Grading Mode		Grade Mode: Normal Grading Mode	

- PHAR 819 Long Care of Patient** **1 Credit hour**
This course will provide the student with pharmacy care of a patient over an extended period of time. Students will be exposed to the role and responsibilities of the pharmacist. The student will demonstrate knowledge of the medical regimen and an understanding of why the medical regimen was or was not modified over a period of time.
Grade Mode: Normal Grading Mode
- PHAR 821 IPPE Institutional** **2 Credit hours**
The Introductory Pharmacy Practice Experience in Institutions is designed to allow the student to demonstrate knowledge and skill learned in the classroom while concurrently gaining understanding to the systems and function of the pharmacy in an institutional setting.
Grade Mode: Normal Grading Mode
- PHAR 881 APPE 1-General Medicine** **5 Credit hours**
Provides students pharmacy experience in a clinical, inpatient, acute care and team-based environment. Students will be expected to utilize multiple abilities learned throughout the curriculum in order to collect patient-specific information, evaluate and monitor drug therapy, educate patients and/or caregivers, respond to drug information inquiries and function effectively within a team.
Grade Mode: Normal Grading Mode
- PHAR 882 APPE 2-Amb Care/Prim Care** **5 Credit hours**
The Amb Care / Prim Care APPE provides students experience in an out-patient care clinically focused practice environment. Students will be expected to utilize abilities learned previously throughout the curriculum in order to perform the following tasks: collect patient-specific information, evaluate and monitor drug therapy, educate patients and caregivers, drug information tasks, and other requirements.
Grade Mode: Normal Grading Mode
- PHAR 883 APPE 3-Advanced Community** **5 Credit hours**
This is a 5-week advanced pharmacy practice experience in a community pharmacy setting that focuses on enhancing a student's ability to provide patient-centered pharmacy care services such as disease management, medication therapy management, preventative health screening, immunizations, specialty compounding, patient education, or other advanced patient care activities.
Grade Mode: Normal Grading Mode
- PHAR 884 APPE 4-Adv Institutional** **5 Credit hours**
This is a 5-week experiential rotation in an approved health system that prepares the student to function within integrated pharmacy services. Particular emphasis is placed on the preparation, distribution, and control of medications, medication monitoring, and the ability to communicate with other healthcare professionals. This rotation develops competence to function as a staff hospital pharmacist.
Grade Mode: Normal Grading Mode
- PHAR 885 APPE 5-Geriatrics** **5 Credit hours**
This is a 5-week experiential rotation that focuses on provision of clinical pharmacy services in a variety of settings with a focus on care to the elderly population. These sites may include community pharmacies, specialty clinics, rehabilitation hospitals, skilled nursing facilities (SNFs), home-based consult services, and assisted living facilities (ALFs). A focus is placed on the interdisciplinary care of the geriatric patient.
Grade Mode: Normal Grading Mode
- PHAR 886 APPE 6-Diverse Populations** **5 Credit hours**
This is a 5-week required advanced pharmacy practice experience in a community, ambulatory, or other pharmacy setting to a medically under-served population. Students will utilize a variety of skills obtained throughout the curriculum. A focus will be providing care in a culturally sensitive, compassionate, community-oriented, and effective way to a diverse, ethnic, rural, poor, and/or indigent population(s).
Grade Mode: Normal Grading Mode
- PHAR 887 APPE 7 & 8-Electives** **5 Credit hours**
The APPE general elective(s) are 5-week experiential rotation(s) that will give the students the opportunity to participate in a variety of pharmacy practice experiences, depending on the rotation site and practice setting, related to direct patient care, supportive patient care, or not related to patient care. Students must complete 2 elective rotations.
Grade Mode: Normal Grading Mode
- PHAR 891 Pharmacy Capstone** **4 Credit hours**
Pharmacy capstone experience where students are challenged to demonstrate acquisition of pharmacy skill, knowledge, and behavior competency.
Grade Mode: Normal Grading Mode
- ## Physiology
- PHS 626 Neurophysiology I** **1 Credit hour**
To study and understand the basic functional principles of the cells of the nervous system, and organization of cells into functional systems.
Pre-req: BMS 600.
Grade Mode: Normal Grading Mode
- PHS 627 Neurophysiology II** **1 Credit hour**
To study and understand the major functional systems of the brain.
Pre-req: PHS 626.
Grade Mode: Normal Grading Mode
- PHS 628 Mammalian Neurophysiology** **2 Credit hours**
This course is a basic introductory, survey course covering neurophysiology from sub-cellular level to behavioral level.
Grade Mode: Normal Grading Mode
- PHS 629 Mammalian Physiology** **6 Credit hours**
A study of mammalian systems including pulmonary, renal, cardiovascular, gastrointestinal, endocrinological and nervous systems. Emphasis will be placed on homeostatic mechanisms and on experimental approaches to physiology.
Grade Mode: Normal Grading Mode
- PHS 630 Experimental Physiology** **1 Credit hour**
A laboratory course in mammalian physiology which includes instruction in surgical preparation, bioinstrumentation technique and open-chest surgery in dogs.
Grade Mode: Normal Grading Mode
- PHS 631 Physiology Practicum** **2 Credit hours**
Experience in laboratory instruction of medical and graduate students in the mammalian physiology laboratory.
Grade Mode: Normal Grading Mode
- PHS 632 Physiology of Sleep** **1 Credit hour**
Detailed examination of changes in EEG, EMG, cardiorespiratory function and ocular motility during sleep.
Pre-req: PHS 629.
Grade Mode: Normal Grading Mode

PHS 634 Advanced Neurophysiology 1-2 Credit hours

Bioelectric potentials. A.C. and D.C. potentials, trans-cortical potentials, E.E.G., corneo-retinal potential, blood-CSF potential, etc.

Pre-req: PHS 629.

Grade Mode: Normal Grading Mode

PHS 638 Adv Cardiovascular Phys 1-2 Credit hours

Pre-req: PHS 629.

Grade Mode: Normal Grading Mode

PHS 639 Neurophys Res Tech 3 Credit hours

Class participants will be exposed to state-of-the-art neurophysiology research techniques while in the laboratories of neurophysiology faculty.

Grade Mode: Credit/No Credit Grade Only

PHS 661 Endocrinology 3 Credit hours

An in depth study of the endocrine system with special emphasis on the role of experimentation in the development of concepts in endocrine physiology (PR: BMS 600 or Equivalent; Permission)

Pre-req: BMS 600.

Grade Mode: Normal Grading Mode

PHS 666 Physiology of the Cell 3 Credit hours

An in-depth study of selected specific topics in cell physiology.

Pre-req: BMS 600.

Grade Mode: Normal Grading Mode

PHS 667 Experimental Appr to Phys 4 Credit hours

This course introduces students to the fundamental principles and research underlying the normal functioning of the cardiovascular, respiratory, renal, endocrine, reproductive, nervous, and gastrointestinal systems.

Pre-req: BMS 601 and BMS 602.

Grade Mode: Normal Grading Mode

PHS 675 Special Topics 1-4 Credit hours

Present course material on special areas of research or topics which are not routinely covered in existing courses.

Grade Mode: Normal Grading Mode

PHS 676 Special Topics 1-4 Credit hours

Present course material on special areas of research or topics which are not routinely covered in existing courses.

Grade Mode: Normal Grading Mode

PHS 677 Special Topics 1-4 Credit hours

Present course material on special areas of research or topics which are not routinely covered in existing courses.

Grade Mode: Normal Grading Mode

PHS 701 Physiology 8 Credit hours

Grade Mode: Normal Grading Mode

PHS 780 Elective Special Projects 1 Credit hour

Grade Mode: Normal Grading Mode

PHS 785 Independent Study 1-15 Credit hours

Independent Study in Physiology is designed to allow the student the opportunity to work with a faculty member on a topic of special interest.

Grade Mode: Credit/No Credit Grade Only

PHS 820 Medical Physiology 1-18 Credit hours

Grade Mode: Normal Grading Mode