

Theme, Subject and Competency		Required core courses						Required courses for the Pharmacology track										Required experiences						
	Term	F	F	S	F/Sp	F	F/Sp	F/Sp	Sp	F														
	Credit	1	4	4	2/2	3	1-2/ 1-2	1/1	4	1														
*Exempt if PharmD from an ACPE accredited University **A total of 4 credits is required		Principles of Biochem* PHARM 3011	Pharmacology and Ther* PHARM 3028	Foundations in Pharm Sci PHARM 30271	Grant Writing PHARM 3038	Statistics PHARM 3040 or equivalent	Journal Club** Student/mentor choice	Seminar** PHARM 3024	Pharmaceutical Analysis PAHRM 2001	Advances in Pharm Sci PHARM 3009									Dissert/Thesis Research	Comprehensive Exam	Manuscripts	Presentations at Scientific Conferences	Teaching Micro-credential	
Learning Outcome from the Graduate Program Assessment Matrix: Acquire expert knowledge of biological, chemical, and analytical processes related to pharmaceutical sciences. Master a field of scholarship related to a specific research topic.																								
LITERATURE REVIEW AND EVALUATION																								
Extract literature from appropriate bibliographic sources.					X		X	X			X								X	X	X		X	
Critique clinical and scientific evidence derived from literature.					X	X	X	X			X								X	X	X			
Describe the current state of knowledge about a biomedical, clinical, or public health problem.			X		X		X	X			X								X		X			
Interpret primary research literature within the pharmaceutical sciences							X		X	X	X										X	X		

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Learning Outcome from the Graduate Program Assessment Matrix: Use the scientific method to generate, analyze, and interpret scientific data relevant to the identification, analysis, and use of therapeutic agents. <ul style="list-style-type: none"> Generate mechanistic hypotheses based on prior evidence Derive specific predictions that are hypothesis-driven Plan detailed experimental procedures that test specific predictions Gather data via experimentation Appropriately analyze and interpret data 																						
HYPOTHESIS GENERATION																						
Generate a relevant biomedical, clinical, public health, or translational research hypothesis.					X													X	X			
Defend the clinical and public health implications of a given research hypothesis.								X										X	X			
RESEARCH METHODS AND STUDY DESIGN																						
Design appropriate experiments to address generated research questions in the pharmaceutical sciences.			X	X					X									X	X			

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Conduct appropriate experiments to address generated research questions.				X	X				X											X					
Evaluate possible problems in the design and execution of a study in the pharmaceutical sciences.				X	X		X	X	X		X									X	X				
Describe the drug development process.				X					X	X															
STATISTICAL METHODS AND DATA EVALUATION																									
Apply fundamental principles of statistical analysis, such as power analysis, correlation, causation, regression, and summary statistics.					X	X	X			X	X									X	X	X			
Select the appropriate statistical approach for the interpretation of preclinical and clinical datasets.						X	X													X	X				
Define bias in clinical and translational research.						X																			
Develop appropriate conclusions based on results from research data.				X	X		X	X	X											X	X	X	X	X	

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Learning Outcome from the Graduate Program Assessment Matrix: Communicate scientific facts, research results and ideas in a clear and compelling way in both oral and written form.																						
<ul style="list-style-type: none">Write a scientific paper of sufficient quality to be published in a nationally recognized peer reviewed journalApply knowledge and understanding of ethical research practices (e.g., ownership of data, authorship, falsification and misrepresentation of data, ethical use of animals in research, use of copyrighted material, plagiarism)Prepare a lecture or seminar that has focus and depth, and that presents information in a clear and informative wayWrite a meritorious grant proposal (i.e., one that is hypothesis-driven, scientifically justified, and appropriately analyzed and interpreted)																						
GRANTSMANSHIP																						
Defend a written research proposal describing specific aims, significance, innovation, and approach.				X															X	X		X
PREPARATION AND DELIVERY OF ORAL AND WRITTEN SCIENTIFIC INFORMATION																						
Develop presentations describing proposed research, research in progress, or research findings.						X	X			X									X	X		X
Assess the clinical implications of scientific information.						X	X			X									X	X	X	

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Prepare publication/presentation quality abstracts, posters, and manuscripts.					X			X												X	X	X	X		
Develop an appropriate response to constructive criticism of oral and written presentations.					X			X												X	X	X	X		

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SCIENTIFIC LEADERSHIP, MANAGEMENT, AND CROSS-DISCIPLINARY TEAMWORK																								
Demonstrate professionalism, interpersonal skills and collegial approaches to teamwork.							X	X		X	X											X	X	X
Mentor students in research, clinical, or professional activities.																							X	
Recognize the strengths and limitations of personal research skills.								X											X	X	X			

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ETHICAL CONDUCT OF RESEARCH																							
Recognize scientific misconduct and conflict of interest.				X															X				