

# THE UNIVERSITY OF RHODE ISLAND

## Pharmaceutical Sciences-BS

Year 120 Credits Total

Page 1 (40 credits of General Education)

2022-2023 Catalog

Effective Fall 2022

Class of 2024,2025,2026

### **ABOUT THE PHARMACEUTICAL SCIENCE BS DEGREE:**

The four-year program offers students a solid foundation in the basic sciences and expertise within the pharmaceutical and biomedical sciences. It is designed to provide educational and training experiences that prepare students for careers in the pharmaceutical, consumer product, and biomedical industries.

Graduates of the B.S.P.S. program will be qualified to seek a diverse range of career options that include: research and development, manufacturing, product marketing, sales, quality, and administrative positions within the pharmaceutical industry; research and regulatory oversight careers within government agencies; and research and teaching positions in academia. As a prelude to many of these career opportunities, the program prepares students for graduate studies in the expanding fields of pharmaceutical and biomedical sciences.

**GENERAL EDUCATION GUIDELINES:** General education is 40 credits. Each of the twelve outcomes (A1-D1) must be met by at least 3 credits. A single course may meet more than one outcome but cannot be double counted towards the 40-credit total. At least one course must be a Grand Challenge (G). No more than twelve credits can have the same course code (note- HPR courses may have more than 12 credits). General education courses may also be used to meet requirements of the major or minor when appropriate.

LIST COURSES THAT MEET GENERAL EDUCATION: *General Education Credit Count			
At least 40 cr. (19 or 22 in the major)			
Course in major	Cr, grade	Choice Course	Cr, grade
BIO103	1		
BIO110 or 101	3		
CHM101	3		
COM100	3		
ECN201	3		
MTH103 (or choice gen ed)	3		
MTH131 or 141	3		
WRT106 or 104	3		
<b>Met by major required courses:</b> 19 (or 24) cr		Out of major	21 (or 18) cr
	Total Gen Ed credits	≥ 40	

LIST COURSE AS EACH OUTCOME IS MET: *General Education Outcome Audit	
	Course
<b>KNOWLEDGE</b>	
<b>A1. STEM</b> BIO110, 103, (MTH 103), MTH131	CHM101
<b>A2. Social &amp; Behavioral Sciences</b>	ECN201
<b>A3. Humanities</b>	
<b>A4. Arts &amp; Design</b>	
<b>COMPETENCIES</b>	
<b>B1. Write effectively</b>	WRT106/4
<b>B2. Communicate effectively</b>	COM100
<b>B3. Mathematical, statistical, or computational strategies</b>	MTH103, 131
<b>B4. Information literacy</b>	WRT106/4
<b>RESPONSIBILITIES</b>	
<b>C1. Civic knowledge &amp; responsibilities</b>	COM100
<b>C2. Global responsibilities</b>	
<b>C3. Diversity and inclusion</b>	
<b>INTEGRATE &amp; APPLY</b>	
<b>D1. Ability to synthesize</b>	
<b>GRAND CHALLENGE</b>	
<b>G. Check that at least one course of your 40 credits is an approved "G" course</b>	

# THE UNIVERSITY OF RHODE ISLAND

## Pharmaceutical Sciences-BS

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Page 2 (Pre-requisites to Major, 54 or 57 credits) (includes 19 or 22 cr gen ed)

2022-2023 Catalog Year

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Class of 2024,2025,2026

Basic Non-Science Requirements (*also fulfill 9 cr of general education requirements)	Course	Grade	Cr	Semester Plan
Careers in Pharmaceutical Science	BPS 250		1	
Communication *B2, C1	COM 100		3*	
Microeconomics *A2	ECN 201		3*	
Research Writing *B1, B4	WRT 106		3*	
Introduction to URI	URI 101		1	

Basic Science /Math Requirements (*also fulfill 10 or 13 cr general education reqs)	Course	Grade	Cr	Semester Plan	QPA
General Biology (or 101) *A1	BIO 110		3*		
General Biology Lab *A1	BIO 103		1*		
Human Anatomy & Physiology I	BIO 220		3		
Human Anatomy and Physiology I lab	BIO 221		1		
Human Anatomy and Physiology II	BIO 222		3		
Human Anatomy and Physiology II lab	BIO 223		1		
General Chemistry I *A1	CHM 101		3*		
General Chemistry I Lab	CHM 102		1		
General Chemistry II	CHM 112		3		
General Chemistry II Lab	CHM 114		1		
Organic Chemistry Lab	CHM 226		2		
Organic Chemistry I	CHM 227		3		
Organic Chemistry II	CHM 228		3		
Medical Microbiology, with lab (or 211)	CMB 201		4		
Biochemistry	CMB 311		3		
Precalculus (MTH103, placement) *A1	MTH 103		3* or 0		
Calculus (or MTH141) *A1, B3	MTH 131		3*		
Statistics (or STA 307, 3 cr; or STA 409, 4 cr)	STA 308		4		

\* Course approved for General Education

### **B.S.P.S. Progression, Retention, and Graduation requirements**

B.S.P.S. students request transfer from University College for Academic Success (UCAS) to the College of Pharmacy (PHARM) during the semester in which they are enrolled to complete all science and mathematics pre-requisite courses (BIO 103, 110, 220, 221, 222, 223; CHM 101, 102, 112, 114, 227, 228; CMB 201, 311; MTH 131 or 141; and STA 308 or 307 or 409). Transfer requests from UCAS to PHARM will be reviewed and acted upon after grades are posted for the enrolled courses. For students who are off-sequence, consideration for transfer to the PHARM may be considered prior to completion of CHM 228, CMB311 or STA 308.

Only those students having an equal or greater than 2.30 quality point average in the required pre-requisite courses (BIO 103, 110, 220, 221, 222, 223; CHM 101, 102, 112, 114, 227, 228; CMB 201, 311; MTH 131 or 141; and STA 308 or 307 or 409), and an overall cumulative grade point average of 2.00 or above will be admitted to the College of Pharmacy for the B.S. Pharmaceutical Sciences degree. Applicants not meeting the criteria will not be considered for admission to the college.

## THE UNIVERSITY OF RHODE ISLAND

### Pharmaceutical Sciences-BS

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Page 3 (Required courses in Major and Professional Electives)

2022-2023 Catalog Year

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Class of 2024, 2025, 2026

<b>Major Requirements (Courses specifically listed are required, 33 credit, includes *4 cr gen ed)</b>				
<b>3<sup>rd</sup> and 4<sup>th</sup> Year</b>	<b>Course</b>	<b>Grade</b>	<b>Cr</b>	<b>Semester Plan</b>
Pharmaceutics I: Biopharmaceutics	BPS 301		2	Fall
Essential Pharmacokinetic Concepts	BPS 306		2	Spring
Principles of Medicinal Chemistry	BPS 313		2	Fall
Pharmaceutics II	BPS 315		4	Fall
Human Drug Metabolism	BPS 325		2	Spring
Intro to Pharmaceutical Research	BPS 345		3	Fall
Pharmaceutical Pharmacology I	BPS 401		3	Fall
Pharmaceutical Pharmacology II	BPS 402		3	Spring
GMPs in Manufacture of Pharmaceuticals	BPS 425		3	Spring
Formulation and Manufacturing Lab	BPS 443		2	Spring
Biotechnology, Biologics, and Biosimilars	BPS 446		3	Spring
	BPS 451		4	Fall
Experiential Education, > 260 hours, 3.33 hr/week for 13 weeks per 1 credit enrolled Fall or Spring semester, proportional for summer or J-term **List enrolled credits under Prof Electives	BPS 460, 497, S or 498		0**	List hours:

### **BSPS Professional Electives (18 credits required)**

\*\*\* Students have the option to tailor their academic program to prepare them for the specific career paths that they choose by taking 18 credits of pre-approved BSPS professional electives. Must be at 300-level or above. May also count toward minor, 2nd major, general education, honors project, experiential education.

At least 9 of the 18 cr of Professional Electives must be under BPS, PHP, or PHC course codes.

<b>Course Name</b>	<b>Course Code (300+)</b>	<b>Grade</b>	<b>Cr</b>	<b>Semester Plan</b>
	BPS/PHC/PHP			
	BPS/PHC/PHP			
	BPS/PHC/PHP			

### **0-12 credits to make $\geq$ 120 total**

(Exact number will vary by student according to transfer credits, general education choices, non-degree credits, initial math placement, credits taken for experiential education, etc.)

<b>Course Name</b>	<b>Course Code</b>	<b>Grade</b>	<b>Cr</b>	<b>Semester Plan</b>

# B.S in Pharmaceutical Sciences (2022-2023 Catalog)

Class of 2026

Requirements by Semester Sequence (for students without prior credits)

For course titles and pre-requisite information, please visit: [uri.edu/catalog](http://uri.edu/catalog)

Fall	Spring	Milestones
<b>Year One</b>		
BIO 110* and 103*, 3+1 cr	BIO 220 and 221, 3+1 cr	Complete BIO, CHM, MTH pre-reqs
CHM 101* and 102, 3+1 cr	CHM 112 and 114, 3+1 cr	Pre-Professional GPA of 2.30 or higher
MTH 103*, 3 cr; or choice Gen Ed*	MTH 131*, 3 cr	Cumulative GPA of 2.0 or higher
COM 100*, 3 cr	WRT 106*, 3 cr	Complete $\geq$ 29 cr.
URI 101, 1 cr		
(15 cr. Total, 13 gen ed)	(14 cr. Total, 6 gen ed)	

<b>Year Two</b>		
BIO 222 and 223, 3+1 cr	CHM 226, 2 cr; or BPS 345 3 cr	Complete BIO, CHM, CMB, STA pre-reqs
CHM 227, 3 cr	CHM 228, 3 cr	Pre-Professional GPA of 2.30 or higher
CMB 201, 4 cr	CMB 311, 3 cr	Cumulative GPA of 2.0 or higher
ECN 201*, 3 cr	STA 308 (or 307 or 409), 4 cr	Complete $\geq$ 60 cr.
BPS 250, 1 cr	*General Education choice, 3-4 cr	Meet progression standards for move from UCAS to College of Pharmacy
(15 cr. Total, 3 gen ed)	(16 cr. Total, 3-4 gen ed)	

<b>Year Three and Four (15-16 cr each semester)</b>		
BPS 301, 2 cr	BPS 306, 2 cr	Advanced knowledge of Pharmacology, Medicinal Chemistry, Pharmacokinetics, and Pharmaceutics. Knowledge of Laboratory Methods, Biologic medications, and choice specialty areas
BPS 313, 2 cr	BPS 325, 2 cr	
BPS 315, 4 cr	BPS 402, 3 cr	
BPS 345, 3 cr (CHM226 if not taken yet)	BPS 425, 3 cr	
BPS 401, 3 cr	BPS 443, 2 cr	
BPS 451*, 4 cr	BPS 446, 3 cr	
*General Education choice, 3 cr		Maintain Professional GPA of 2.3 or higher, Cumulative GPA of 2.0 or higher
*General Education choice, 3 cr	*General Education choice, 3 cr	
Professional Elective, 3 cr	Prof Elective/*Gen Ed choice, 3 cr	
Professional Elective, 3 cr	Professional Elective, 3 cr	Complete $\geq$ 120 cr. for graduation
Professional Elective, 3 cr	Professional Elective, 3 cr	

Note: This plan is not intended to be prescriptive. Credits in transfer, summer or winter-term coursework, or overlap between general education and professional electives may result in deviations from the above recommendations.

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Page 4 (Pre-approved Professional Electives)

2022-2023 Catalog Year  
Effective Fall 2022  
Class of 2024, 2025, 2026

List current as of November 2021

## **Pre-approved BSPS Professional Electives (18 credits required)**

\*\*\* Students have the option to tailor their academic program to prepare them for the specific career paths that they choose by taking 18 credits of pre-approved BSPS professional electives. Must be at 300-level or above. May also count toward minor, 2nd major, general education, honors project, experiential education. At least 12 of the 18 cr of Professional Electives must be under BPS, PHP, or PHC course codes.

The following courses have pre-requisites that all or most BS Pharm Science students will have completed. In addition to the courses listed, 300+ level courses from a second degree or minor will be considered for approval.

### **Undergraduate-level courses with BPS, PHC, PHP codes**

#### **BPS 352: Personal Cosmetics**

**LEC:** (3 crs.) Formulation and manufacture of various types of personal cosmetics and toilet preparations. Examples of types studied are prepared in laboratory. (Lec. 2, Lab. 3) Pre: first-year Doctor of Pharmacy professional student in good standing or permission of instructor.

#### **BPS 411: Biostatistics II**

**LEC:** (4 crs.) Cross-listed as (STA), PHP, BPS 411. An overview of statistical methods with applications to health-related studies. Chi-square tests, effect measures, analysis of variances, multiple comparison procedures, linear and logistic regression, some nonparametric and survival tests. (Lec. 3, Rec. 1) Pre: STA 307, or 308, or 409, or permission of instructor

#### **BPS 426: cGMP Environmental Risks, Control and Monitoring**

**LEC:** (3 crs.) Principles of clean room design and operations for the pharmaceutical and biotechnology industry. Reviews clean room operations and monitoring fundamentals. Monitoring and sampling will be performed in a cGMP environment. (Lec. 3) Pre: Concurrent enrollment in the BSPS, PharmD or other related programs. Alternatively, prior experience in the pharmaceutical or biotechnology industry. Not for graduate credit

#### **BPS 436: Psychotropic Drugs and Therapy**

**LEC:** (3 crs.) Cross-listed as (BPS), PSY 436. Interaction of drug and non-drug therapy and of physiological and psychological origins of psychopathology. Intended for advanced undergraduate and graduate students interested in clinical psychology. (Lec. 3) Pre: any one of the following--BIO 101, 104B, 113, 121, PSY 381, or permission of instructor. Not for graduate credit

#### **BPS 445: Natural Product Drugs**

**LEC:** (3 crs.) Discovery, development, biosynthesis and general fundamental properties of natural product drugs. (Lec. 3) Pre: CHM 228; CMB 201 or equivalent

#### **BPS 450: Practical Tools for Molecular Sequence Analysis**

**LEC:** (3 crs.) Cross-listed as (CMB), BPS 450. Introduction to practical ways to analyze DNA, protein and genome datasets. Students will be introduced to computing environments and publicly available software tools for analysis. (Lec. 2, Lab. 2) Pre: CMB 311 or BIO 352 (or CMB 352) or BIO 341 or permission of instructor. Not for graduate credit

### **BPS 455: Protein Molecular Modeling for Biomedical Sciences**

**LEC:** (3 crs.) Cutting edge computer software to study the 3D-structure of proteins/RNA/DNA of biomedical interest. Application of course topics will be required via case study or research project. (Lec. 3) Pre: CMB 311 and CHM 227. Not for graduate credit

### **BPS 460: Pharmaceutical Science Internship/Field Experience**

**PRA:** (0, 3, 6, 9, or 12 crs.) Undergraduate BS Pharmaceutical Science majors completing approved Off Campus Experience. Fall, Spring, or Summer Semester. Registration is by permission number only. (Practicum) Pre: Permission number required. May be repeated for a maximum of 12 credits. Not for graduate credit. S/U only

### **BPS 497: Special Problems**

**IND:** (1-5 crs.) Methods of carrying out a specific research project. Literature search, planning, laboratory work, writing an acceptable report. (Independent Study) Pre: permission of chairperson. Not for graduate credit

### **BPS 498: Special Problems**

**IND:** (1-5 crs.) Methods of carrying out a specific research project. Literature search, planning, laboratory work, writing an acceptable report. (Independent Study) Pre: permission of chairperson. Not for graduate credit

### **BPS 533: Medicinal Plants**

**This is NOT a graduate class.**

**LEC:** (3 crs.) Problems in drug plant chemotaxonomy with field work in the drug plant gardens. Emphasis is placed on certain alkaloid, glycoside and oil-yielding plants, weedicides and insecticides as related to measures for control. (Lec. 2, Lab. 3) Pre: third-year Doctor of Pharmacy student in good standing, or permission of the instructor

### **BPS 542: Bioinformatics I**

**This is NOT a graduate class. It is a project-based class that groups biomedical/pharmaceutical students with computer science/engineering/statistics students to make a project.**

**LEC:** (3-4 crs.) Cross-listed as (CSC), STA, CMB 522, BPS 542. Integrates computing, statistical, and biological sciences, algorithms, and data analysis/management. Multidisciplinary student research teams. Modeling dynamic biological processes. Extra project work for 4 credits. (Lec. 3, Project 3) Pre: major in a computing, statistical, or biological science or permission of instructor

### **PHP 336G: Exploring Interdisciplinary Healthcare Solutions for Opioid Use Disorder**

**LEC:** (3 crs.) The theme of this course is an interdisciplinary survey of a multifaceted response to opioid epidemic in the United States through the lenses of pharmacy, epidemiology, and sociology. (Lec. 3) Pre: Junior standing or higher. \*D1, \*C1, \*G

### **PHP 405: Epidemiology in Health Care**

**LEC:** (4 crs.) Basic principles of epidemiology as they apply to public health research and practice; emphasizing the practical application of epidemiologic knowledge to literature evaluation. (Lec. 3, Independent Study) Pre: STA 307, PSY 200 (300) or PHP 305. Open only to juniors and seniors. Not for graduate credit. \*D1, \*B4

## **Undergraduate-level courses (non-College of Pharmacy)**

### **STA 305: Introduction to Statistical Computing with R**

**LEC:** (4 crs.) Introduction to statistical computing using R. This course will have two components. In the first part of the course you will learn how to write efficient and transparent programs in R. In the second part of the course, you will learn about packages and functions that are used for statistical analyses, techniques for managing data, and using graphs to visualize data. (Lec. 3, Lab. 1) Pre: (MTH 103 or MTH 111 or MTH 131 or MTH 141) and (STA 220 or STA 307 or STA 308 or STA 409) or permission of instructor

### **STA 400: Introduction to the Analysis of Missing Data**

**LEC:** (4 crs.) Upper-level undergraduate course in missing data analysis. Covered topics will include missing data methods in experiments, deletion methods, single imputation methods, and multiple imputations. (Lec. 3, Rec. 1) Pre: STA 307, or STA 308, or STA 409, or permission of the instructor

### **STA 411: Biostatistics II**

**LEC:** (4 crs.) Cross-listed as (STA), PHP, BPS 411. An overview of statistical methods with applications to health-related studies. Chi-square tests, effect measures, analysis of variances, multiple comparison procedures, linear and logistic regression, some nonparametric and survival tests. (Lec. 3, Rec. 1) Pre: STA 307, or 308, or 409, or permission of instructor

### **STA 412: Statistical Methods in Research II**

**LEC:** (4 crs.) Analysis of variance (one and two ways) and multiple comparison methods. Simple and multiple linear regression, correlation analysis, and model selection methods. (Lec. 3, Rec. 1) Pre: STA 307 or 308 or 409

### **STA 414: Measurement of Health Outcomes**

**LEC:** (3 crs.) Cross-listed as (PHP), STA 414. This course introduces classical psychometric theories and helps students understand methods to measure important health outcomes of medication use, including clinical, humanistic, and economic outcomes. (Lec. 3) Pre: PHP 405, STA 411 or equivalent; graduate student standing or permission of the instructor

### **STA 460: Introduction to Time Series Analysis**

**LEC:** (4 crs.) Modeling, estimation, inference, and forecasting methods are illustrated with applications from different fields. (Lec. 3, Lab. 1) Pre: STA 307 or STA 308, or equivalent, or permission of instructor. Not for graduate credit

### **DSP 310: Programming for Data Science**

**LEC:** (4 crs.) Cross-listed as (CSC), DSP 310. Data driven programming; data sets, file formats and meta-data; descriptive statistics, data visualization, and foundations of predictive data modeling; accessing web data and data bases; distributed data management. (Lec. 3, Lab. 2) Pre: CSC201 or CSC211 or equivalent, or permission of instructor. Computer Science majors must take as CSC 310; Data Science majors must take as DSP 310

### **DSP 439: Big Data Analysis**

**LEC:** (3 crs.) Cross-listed as (BIO), DSP 439. Learn about big data and how to write scripts to analyze data. (Lec. 3) Pre: junior standing, MTH 131 or 141. Not for graduate credit

### **BIO 320: Introduction to Computational Biology**

**LEC:** (3 crs.) Cross-listed as (CMB), BIO 320. Introduction to the current topics of computational biology. Students will obtain hands-on experiences in navigating biological databases and analyzing biological data. (Lec. 3) Pre: CMB 201 or CMB 211

### **BIO 341: Principles of Cell Biology**

**LEC:** (3 crs.) Cross-list as (BIO), CMB 341. An introduction to the structure and organization of eukaryotic cells. Topics include membranes and organelles, gene expression, protein synthesis and secretion, energy utilization, the cytoskeleton, and signal transduction. (Lec. 3) Pre: one semester of biological sciences and one semester of organic chemistry

### **BIO 352: General Genetics**

**LEC:** (4 crs.) Cross-listed as (BIO), CMB 352. Introduction to basic genetic principles and concepts leading to an understanding of genes, heredity, and the nature of inherited variation. Applications and implications for animals, plants, fungi and bacteria. (Lec. 3, Rec. 1) Pre: BIO 101 and BIO 102

### **BIO 437 Fundamentals of Molecular Biology**

**LEC:** (3 crs.) Cross-listed as (BIO), CMB 437. Biochemical basis of heredity as seen through the structure and function of nucleic acids. Includes DNA replication, transcription, translation, gene regulation, and gene organization in prokaryotes and eukaryotes. Current methods emphasized. (Lec. 3) Pre: CMB 211, BIO 352, and CMB 311, or permission of instructor

### **BIO 439: Big Data Analysis**

**LEC:** (3 crs.) Cross-listed as (BIO), DSP 439. Learn about big data and how to write scripts to analyze data. (Lec. 3) Pre: junior standing, MTH 131 or 141. Not for graduate credit

### **BIO 440G: How Our Genes and the Environment Shape Our Lives**

**LEC:** (3 crs.) Explore how deteriorating environments alter early human embryological development, increasing diseases and neurological disorders, altering entire societies. (Lec. 3) Pre: BIO101 and junior standing. (A1) (B2) (GC)

### **BIO 452: Advanced Topics In Genetics**

**LEC:** (3 crs.) Cross-listed as (CMB), BIO 452. More detailed treatment of topics introduced in the general genetics course (352) including aspects of transmission genetics, molecular genetics, cytogenetics, biotechnology, developmental genetics, and the impact of genetics on society. (Lec. 3) Pre: BIO 352

### **BIO 482G: Biology of Human Health and Disease**

**LEC:** (3 crs.) An applied study of the evolutionary drivers of human health and of our current understanding of the ecological, genetic, and molecular mechanisms underpinning disease conditions. (Lec. 3) Pre: BIO/CMB 352 and one additional BIO course at 200 level or above. Not for graduate credit. (D1) (GC)

### **CMB 333: Immunology and Serology**

**LEC:** (3 crs.) Introduction to the immune response; host resistance to infection; immunopathology; antibodies, antigens, and use of serological techniques. (Lec. 3) Pre: CMB 201 or 211

### **CMB 334: Virology**

**LEC:** (3 crs.) An introduction to the basic aspects of virus structure, classification, and replication as these relate to viruses as agents of infectious disease. (Lec. 3) Pre: CMB 201 or 211

### **CMB 420: Microbiomes, Biofilms and Bacterial Communities**

**LEC:** (3 crs.) A study of bacterial microbiomes and their interaction with hosts and/or their environment. Emphasis will be placed on attached bacterial communities in environmental and disease contexts. (Lec. 3) Pre: Either CMB 201 or CMB 211 or graduate standing with permission of instructor

### **CMB 426: Structural Biochemistry**

**LEC:** (3 crs.) Introduction to the theoretical foundations underlying protein and nucleic acid structure and experimental methods for three-dimensional structure determination. (Lec. 3) Pre: CMB 311 or permission of instructor

### **CMB 432: Pathogenic Bacteriology**

**LEC:** (3 crs.) Principles of bacterial pathogenesis with an emphasis on cellular and molecular mechanisms of diseases caused by clinically relevant bacteria. Laboratory focus on diagnostic methods (Lec. 2, Lab. 1) Pre: CMB 201 or CMB 211

### **CMB 435: Introduction to the Biology and Genetics of Cancer**

**LEC:** (3 crs.) Comprehensive instruction in the biology, genetics and biochemistry of cellular transformation and cancer. (Lec. 3) Pre: CMB 311 or CMB 352, or permission of instructor

### **CMB 437: Fundamentals of Molecular Biology**

**LEC:** (3 crs.) Cross-listed as (BIO), CMB 437. Biochemical basis of heredity as seen through the structure and function of nucleic acids. Includes DNA replication, transcription, translation, gene regulation, and gene

organization in prokaryotes and eukaryotes. Current methods emphasized. (Lec. 3) Pre: CMB 211, BIO 352, and CMB 311, or permission of instructor

#### **CMB 464: Biochemistry of Metabolic Disease**

**LEC:** (3 crs.) A study of the primary and secondary molecular changes in human metabolic diseases. Topics include aging, alcoholism, arteriosclerosis, diabetes, depression, and genetic diseases. (Lec. 3) Pre: CMB 311 or 481

#### **CMB 482: Proteins and Enzymes**

**LEC:** (3 crs.) Advanced discussions of selected topics in protein structure and function, enzyme catalysis and regulation, and case studies of proteins and enzymes in biological processes and diseases. (Lec. 3) Pre: CMB 311 or equivalent

#### **CMB 483: Introductory Diagnostic Microbiology**

**LEC:** (3 crs.) Cross-listed as (CMB), MLS 483. Diagnosis of infectious diseases by use of microbiology, immunology, and hematologic and clinical chemical methods; organisms covered include viruses, bacteria, fungi, and parasites. (Lec. 3) Pre: CMB 201 or 211. Open only to medical laboratory science, microbiology, and cell and molecular biology majors or permission of instructor. (D1)

#### **MLS 360: Fundamentals of the Medical Laboratory**

**LEC:** (3 crs.) Introduction to the basic concepts and methodologies of medical laboratory science, including clinical aspects of its specialty areas: chemistry, hematology, immunology, immunohematology and microbiology. (Lec. 3) Pre: Credit or concurrent enrollment in CMB 201 or CMB 211

#### **CHM 212: Quantitative Analysis – Note: Exception to minimum 300 level course code**

**LEC:** (4 crs.) Principles of gravimetric and volumetric analysis with detailed attention to solution of stoichiometric problems. Laboratory analysis of representative substances by gravimetric or volumetric procedures. (Lec. 3, Lab. 3) Pre: CHM 112 and 114 with grade of C- or better or CHM 192 with grade of C- or better

#### **CHM 391: Forensic Science Overview**

**LEC:** (1 cr.) A seminar/discussion group designed to introduce students to the areas and issues in Forensic Science. Students seeking a forensic science minor should attend this weekly seminar two semesters. (Lec. 1) May be repeated for a total of 3 credits

#### **CHM 392: Introduction to Criminalistics**

**LEC:** (3 crs.) Cross-listed as (CHM), FOS 392. A class designed to introduce students to the basic areas and issues in forensic science in criminalistics. It is required for students seeking a forensic science minor. May not be repeated for credit. May not be taken in the same semester as CHM 391. (Lec. 3)

#### **CHM 427: Intermediate Organic Chemistry**

**LEC:** (3 crs.) Intermediate organic chemistry with emphasis on organic reaction mechanism, stereochemistry, spectroscopic characterization, and newer synthetic methods. (Lec. 3) Pre: CHM 226 and 228 with a grade of C- or better, or CHM 292 with a grade of C- or better

#### **CHM 425: Qualitative Organic Analysis**

**LAB:** (2 crs.) Techniques in organic chemical research, including handling air sensitive chemicals, flash chromatography, and instrumental methods of structure determination. Separation of mixtures and identification of components by infrared and nuclear magnetic resonance spectroscopies. (Lab. 6) Pre: CHM 292 or 226 and 228 and credit or concurrent enrollment in CHM 427

NEU Neuroscience courses – to be determined

**NEU 301: Cellular and Molecular Neurosciences**, Pre: NEU 101 and BIO 101 and 102

**NEU 310: Developmental Neurobiology**, Pre: NEU 101.

## Graduate-level courses with BPS, PHC, PHP codes

*Note: Consult with instructor (or BSPS advisor) prior to enrollment to judge individual students' preparation for graduate-level course. Typically, a BSPS student will take no more than one or two Graduate-level courses. The following 500- level classes are designed for first-year Masters degree. They are appropriate for senior undergraduates if the area is specific to one's interest and aptitude.*

### **PHC 502: Drug Development**

**LEC:** (3 crs.) Scientific and regulatory aspects of drug development from discovery to market, exemplified by URI research. (Lec. 3) Pre: graduate standing in Pharmacy. Open to CHE students in pharmaceutical track

### **PHC 520: Pharmaceutical Sciences Journal Club**

**LEC:** (1 cr.) Critical reviews of current research reports in the field of pharmaceutical sciences. The students will be evaluated on the basis of their effectiveness in organization, interpretation, and oral presentation, according to criteria already established in the department. (Lec. 1) Pre: graduate standing or in good standing in the P1-P4 years of the Pharm.D. curriculum

### **BPS 530: Drug Metabolism**

**LEC:** (3 crs.) Mechanisms of Phase 1 (oxidation, reduction, hydrolysis) and Phase 2 (conjugations and synthesis) of drug metabolism. (Lec. 3) Pre: CMB 581 or permission of instructor. Offered every spring

### **BPS 535: Pharmaceutical Biotechnology**

**LEC:** (3 crs.) Introduction to pharmaceutical biotechnology, including drug design, DNA sequencing, cloning, recombinant proteins, monoclonal antibodies, and drug-screening techniques. (Lec. 3) Pre: CMB 581 or permission of instructor

### **BPS 536: Biotechnology Product Evaluation and Development**

**LEC:** (3 crs.) Cross-listed as (MLS 571), BPS 536. The process through which candidate products produced using recombinant DNA technology are evaluated for safety and efficacy, including conductance of clinical trials, economic issues, and regulatory affairs. (Lec. 3/Online) Pre: graduate standing and permission of chairperson

### **BPS 540: Advanced Drug Delivery Systems**

**LEC:** (3 crs.) Cross-listed as (BPS), CHE 540. The course will present the design and principles of advanced drug delivery systems, which have specified drug delivery profiles and significant advantages in therapeutics over conventional dosage forms. (Lec. 3) Pre: Graduate standing or BPS 315

### **BPS 546: Advanced Toxicology**

**LEC:** (3 crs.) Toxic effects of selected drugs and other xenobiotics on physiological and biochemical processes. (Lec. 3) Pre: permission of instructor. Offered every third year

### **BPS 550: Practical Tools for Molecular Sequence Analysis**

**LEC:** (3 crs.) Cross-listed as (CMB), BPS 550. Students will be introduced to practical ways to analyze DNA, protein and genome datasets. Students will be introduced to computing environments and publicly available software tools for analysis. Pre: CMB 311 or BIO/CMB 352 or BIO 341 or permission of instructor

### **BPS 551: Chemistry of Natural Products**

**LEC:** (3 crs.) Introduction to chemistry of certain groups of natural products especially in relation to their chemotaxonomic position in plant classification. Topics limited to secondary metabolites; e.g., terpenoids, phenolic compounds, aromatic compounds, phytosterols, alkaloids. (Lec. 3) Pre: CHM 228 and CHM 230. In alternate years

### **BPS 552: Advanced Medicinal Chemistry**

**LEC:** (3 crs.) Covers didactic topics of medicinal chemistry: Drug Discovery, Design, and Development; Drug-Receptor Interactions; Mechanisms of Enzyme Catalysis and Cofactors; Enzyme Inhibition and Inactivation; DNA Interactive Agents; Drug Metabolism; Prodrugs and Drug Delivery Systems. Pre: Introductory Organic Chemistry and permission of instructor

### **BPS 553: (550) Bionanotechnology**

**LEC:** (3 crs.) Cross-listed as (CHE), BPS 553. Principles and applications of bionanotechnology. Intermolecular forces, self-assembly, biomolecular structure, biological processes, molecular manufacturing, and surface functionalization for designing biodevices and nanomaterials. Overview of current and emerging technologies, safety and ethics. (Lec. 3) Pre: Graduate standing; or BPS 315 and CHM 112

### **PHP 540: Principles, Methods, and Applications of Epidemiology**

**LEC:** (3 crs.) An introduction to epidemiology, the study of health and disease in populations. Epidemiologic methods and research design for conducting and interpreting health research. (Lec. 3) Pre: STA 307; second- or third-year Doctor of Pharmacy professional student in good standing; or permission of the instructor

### **PHP 550: Pharmacoepidemiology**

**LEC:** (3 crs.) The application of epidemiologic principles to the study of drug effects in human populations. (Lec. 3) Pre: PHP 540, third year Doctor of Pharmacy student in good standing; or permission of the instructor

### **PHP 575: Causal Inference for Biomedical Research**

**LEC:** (3 crs.) Cross-listed as (PHP), STA 575. Using a potential outcomes framework, this course will present methodologies for drawing causal inference in a variety of settings. Examples will be drawn from epidemiologic and medical studies. (Lec. 3) Pre: STA 411 or 412 or permission of instructor

### **PHP 580: Pharmacoeconomic Analysis**

**LEC:** (3 crs.) Introduction to methodologic approaches utilized in economic evaluation of drug use and therapy in community and managed care settings, and clinical trials, including the FDA approval process and liability issues. (Lec. 3) Pre: STA 307 or equivalent, or permission of instructor. In alternate years

### **PHP 585: Measurement of Health Outcomes**

**LEC:** (3 crs.) Cross-listed as (PHP), STA 414. This course introduces classical psychometric theories and helps students understand methods to measure important health outcomes of medication use, including clinical, humanistic, and economic outcomes. (Lec. 3) Pre: PHP 405, STA 411 or equivalent; graduate student standing or permission of the instructor

### **STA 525: Programming and Data Management in SAS**

**LEC:** (4 crs.) Data managing and programming in SAS: data input, formatting and labeling, conditional processing, iterative processing, numeric and character functions, customized reports, data visualization, and basic statistical analysis. (Lec. 3, Rec. 1) Pre: STA 307 or STA 308 or STA 409 or permission from instructor