PHARMACEUTICAL SCIENCE

Degrees Offered

Bachelor of Science in Pharmaceutical Science

Program Description

The Bachelor of Science in Pharmaceutical Science program is a didactic and experience-based program that prepares students to pursue entry-level careers in the pharmaceutical industry or in biotechnology. Graduates of this program may also pursue graduate education (MS, PhD) or professional degree programs (PharmD, DDS, MD, DO).

Admission

Students who wish to purse the BS in Pharmaceutical Science degree may do so upon admission to the University. First time college students' preparation for admission should include successful completion of high school coursework in algebra, pre-calculus, chemistry, and biology. High school physics is strongly recommended. The degree program is also open to qualified transfer and international students.

Learning Outcomes

- Demonstrate and apply the Pharmaceutical Sciences knowledge and skills to human health, biopharmaceutical, and biotechnology problems.
- Demonstrate effective and appropriate abilities within their discipline with respect to:
  - Verbal and written communication.
  - Collaboration and teamwork.
  - Interactions with individuals from various cultures and ethnicities.
  - Retrieval of information from appropriate resources.
  - Use of information and data (quantitative and qualitative) in decision making.
  - Professionalism in pharmaceutical and biotechnology fields.
  - Engage in community-based activities aimed at advancing society or assisting others.

Bachelor of Science in Pharmaceutical Science

The BSPS will prepare graduates for entry level employment in the pharmaceutical industry and is offered to admitted University of the Pacific students. To earn the Bachelor of Science in Pharmaceutical Science degree, students must complete a minimum of 120 units with a Pacific cumulative grade point average of 2.0.

I. General Education Requirements

For more details, see General Education (http://catalog.pacific.edu/stocktongeneral/generaleducationprogram/)

Minimum 28 units and 9 courses that include:

A. CORE Seminars (2 courses)

CORE 001	Problem Solving & Oral Comm	3
CORE 002	Writing and Critical Thinking	4

Note: 1) CORE Seminars cannot be taken for Pass/No Credit. ***2)*** Transfer students with 28 or more transfer credits taken after high school are exempt from both CORE seminars.

B. Breadth Requirement (7 courses, at least 3 units each)

At least one course from each of the following areas:

- Artistic Process & Creation
- Civic & Global Responsibility
- Language & Narratives
- Quantitative Reasoning
- Scientific Inquiry
- Social Inquiry
- World Perspectives & Ethics

Note: 1) No more than 2 courses from a single discipline can be used to meet the Breadth Requirement.

C. Diversity and Inclusion Requirement

All students must complete Diversity and Inclusion coursework (at least 3 units)

Note: 1) Diversity and Inclusion courses can also be used to meet the breadth category requirements, or major or minor requirements.

D. Fundamental Skills

Students must demonstrate competence in:

- Writing
- Quantitative Analysis (Math)

Note: 1) Failure to satisfy the fundamental skills requirements by the end of four semesters of full-time study at the University is grounds for academic disqualification.

II. Specified Course and General Science Requirements

BIOL 061	Principles of Biology	5
BIOL 116	Applied Microbiology	4
BIOL 117	Applied Physiology	4
BIOL 118	Applied Biochemistry and Molecular Biology	4
CHEM 026	Applied General Chemistry I	4
CHEM 028	Applied General Chemistry II	4
CHEM 122	Applied Organic Chemistry I	4
CHEM 124	Applied Organic Chemistry II	4

Note: CHEM 025, CHEM 027, CHEM 121 & CHEM 123, may be used to meet the Chemistry requirements BIOL 145, BIOL 180, BIOL 101 and BIOL 169 may be used to meet the Biology requirements.

Each of the following:		
PHYS 017	Concepts of Physics	4
MATH 033	Elements of Calculus	4
COMM 027	Public Speaking	3
Select one of the following:		
PSYC 017	Abnormal and Clinical Psychology	4
PSYC 031	Introduction to Psychology	4
Select one of the following:		
ECON 051	Economic Principles and Problems	3
ECON 055	Introductory Macroeconomics: Theory and Policy	4

III. Major Requirements

BSPS 101	Introduction to Pharmacology	4
BSPS 102	Drugs, Drug Development, and Good Practices	4

BSPS 103	Introduction to Statistics and Experimental Design	4
BSPS 104	Physical Principles in Pharmacy	4
BSPS 105	Industrial Pharmacy I	4
BSPS 110	Introduction to Pharmaceutical Analysis	4
BSPS 115	Industrial Pharmacy II	4
BSPS 120	Drug Disposition (Liberation, Absorption, Distribution, and Elimination)	4
BSPS 125	Clinical Pharmacology in Drug Development	2
BSPS 130	Quality in Pharmaceuticals: Control and Assurance	4
Select one of the following:		6-8
BSPS 186	Laboratory Research in Pharmaceutical Sciences	
BSPS 187	Experiential Training in Pharmaceutical Sciences	
Electives:		8-12
PMED 136	Making of Medicines: The Process of Drug Development	
PMED 271	Design Thinking for Entrepreneurs	
PMED 272	Clinical Pharmacology in Drug Development	
PMED 273	Marketing Principles and Applications for Pharma Entrepreneurs	
PMED 274	Regulatory Science for Drug Development Scientists	

BS Pharmaceutical Scien Courses

BSPS 101. Introduction to Pharmacology. 4 Units.
This course will provide the foundational principles of pharmacology, a survey course that describes application, mechanism of action, and side effects of different classes of drugs. Prerequisites: Completion 31 units of undergraduate GE including CORE 001 and CORE 002, 2 semesters General Chemistry CHEM 025, CHEM 026 OR CHEM 027, CHEM 028, and 2 semesters Organic Chemistry CHEM 121, CHEM 122 or CHEM 123, CHEM 124, and BIOL 061, BIOL 116, BIOL 117, BIOL 118 or on permission of instructor.

BSPS 102. Drugs, Drug Development, and Good Practices. 4 Units.
This course covers basic knowledge of Information Management, Intellectual Property and Patenting, Research Laboratory Operations and Safety, Good Manufacture Practice (GMP), and Good Clinical Practice (GCP). Students will design an interdisciplinary project based upon relevant contributions of their backgrounds and interests. Prerequisites: Completion 31 units of undergraduate GE including CORE 001 and CORE 002, 2 semesters General Chemistry CHEM 025, CHEM 026 OR CHEM 027, CHEM 028, and 2 semesters Organic Chemistry CHEM 121, CHEM 122 or CHEM 123, CHEM 124, and BIOL 061, BIOL 116, BIOL 117, BIOL 118 or on permission of instructor.

BSPS 103. Introduction to Statistics and Experimental Design. 4 Units.
This course involves the study of the application and limitations of statistical methods of inference as they apply to the fields of chemistry and the pharmaceutical sciences. Topics include the use of parameters statistics for statistical inference, comparisons of means, analysis of variance, linear regression. Parametric statistics and nonparametric measures of association and elements of good experimental design are also included. Prerequisites: Completion 31 units of undergraduate GE including CORE 001 and CORE 002, 2 semesters General Chemistry CHEM 025, CHEM 026 OR CHEM 027, CHEM 028, and 2 semesters Organic Chemistry CHEM 121, CHEM 122 or CHEM 123, CHEM 124, and BIOL 061, BIOL 116, BIOL 117, BIOL 118 or on permission of instructor.

BSPS 104. Physical Principles in Pharmacy. 4 Units.
An introduction to the applications of physicochemical principles used in dosage form development. Prerequisites: Completion 31 units of undergraduate GE including CORE 001 and CORE 002, 2 semesters General Chemistry CHEM 025, CHEM 026 OR CHEM 027, CHEM 028, and 2 semesters Organic Chemistry CHEM 121, CHEM 122 or CHEM 123, CHEM 124, and BIOL 061, BIOL 116, BIOL 117, BIOL 118 or on permission of instructor.

BSPS 105. Industrial Pharmacy I. 4 Units.
This course is the first part of the Industrial Pharmacy course series designed for students, with emphasis unit operations, technology, and formulation of pharmaceuticals. This is especially useful to professional students who are interested in pursuing careers in the pharmaceutical and biopharmaceutical industry. The basic understanding of pharmaceutical operations as they are applied to semi-solid and modified release dosage forms from laboratory scale to manufacturing scale will be discussed in lectures and all students will conduct hands on experiments. In addition, quality and regulatory processes will be outlined for semi-solid and modified release dosage forms. Prerequisites: Completion 31 units of undergraduate GE including CORE 001 and CORE 002, 2 semesters General Chemistry CHEM 025, CHEM 026 OR CHEM 027, CHEM 028, and 2 semesters Organic Chemistry CHEM 121, CHEM 122 or CHEM 123, CHEM 124, and BIOL 061, BIOL 116, BIOL 117, BIOL 118 or on permission of instructor.

BSPS 110. Introduction to Pharmaceutical Analysis. 4 Units.
An introduction to the experimental analytical methods used for the identification and quantification of active pharmaceutical molecules and assessment of pharmaceutical quality. Prerequisites: Completion 31 units of undergraduate GE including CORE 001 and CORE 002, 2 semesters General Chemistry CHEM 025, CHEM 026 OR CHEM 027, CHEM 028, and 2 semesters Organic Chemistry CHEM 121, CHEM 122 or CHEM 123, CHEM 124, and BIOL 061, BIOL 116, BIOL 117, BIOL 118 or on permission of instructor.

BSPS 115. Industrial Pharmacy II. 4 Units.
This course is the second part of the Industrial Pharmacy course series designed for students, with emphasis unit operations, technology, and formulation of pharmaceuticals. This is also very useful to professional students who are interested to pursue careers in the pharmaceutical and biopharmaceutical industry. The basic understanding of pharmaceutical operations as they are applied to semi-solid and modified release dosage forms from laboratory scale to manufacturing scale will be discussed in lectures and all students will conduct hands on experiments. In addition, quality and regulatory processes will be outlined for semi-solid and modified release dosage forms. Prerequisites: Successful completion of BSPS 105 or on permission of the instructor.

BSPS 120. Drug Disposition (Liberation, Absorption, Distribution, and Elimination). 4 Units.
This course is intended to teach students the chemical and biological principles of biotransformation of pharmaceutical agents and its impact on drug release, absorption and its disposition in the body after absorption. This course is designed to introduce the basic LADME scheme used in drug product development. Prerequisites: Successful completion of BSPS 102 and 104 or on permission of the instructor.

BSPS 125. Clinical Pharmacology in Drug Development. 2 Units.
The course will cover important aspects of clinical pharmacology related to drug development. This course will benefit anyone interested in learning how to bring a compound to approval. The course will be delivered by leading experts in the field, with case studies presented for each topic covered. Prerequisites: Successful completion of BSPS 101, 102 and 105 or on permission of the instructor.

BSPS 130. Quality in Pharmaceuticals: Control and Assurance. 4 Units. This introductory course provides a basic understanding of quality in pharmaceuticals during manufacture of active ingredients, specific products. Students will understand how to scale up from laboratory to commercial production. The different guidance's used by regulatory authorities to ensure the quality of pharmaceutical products will be discussed. Prerequisites: Successful completion of BSPS 105 and BSPS 115, or on permission of the instructor.

BSPS 186. Laboratory Research in Pharmaceutical Sciences. 6-8 Units. The learning experience will allow the student to collaborate with others in a faculty laboratory, at other academic institution labs, in a government laboratory, or other identified laboratory research site. At these entities, students will learn and further develop advanced techniques and the practical application of the principles learned in and across several courses. Prerequisites: Completion of all didactic course work or on permission of the instructor.

BSPS 187. Experiential Training in Pharmaceutical Sciences. 6-8 Units. The learning experience will allow the student to collaborate with others at pharmaceutical/chemical/biotechnology industrial sites. At these entities, students will learn and further develop advanced techniques and practical applications of the principles learned in several courses. Prerequisites: Completion of all BS in Pharmaceutical Sciences didactic course work (semesters 1-6) or on permission of the instructor.