General Courses of Master Degree in Pharmaceutical Sciences

First Semester (6 cr. h)
Core Courses

No.	Course code	Courses	Credit hours	
			L	**P**
1	0600701	Basics of Research and Ethics	2	--
2	0600702	Computer Sciences	2	--
3	0600703	Applied Statistics	2	--
Total			**6**	

Second Semester
Elective Courses (6 cr. h)

No.	Course code	Courses	Credit hours	
			L	**P**
4	0600704	Advanced Chromatographic Methods of Analysis	2	--
5	0600705	Modern Pharmaceutical Research Techniques	2	--
6	0600706	Basics of Pharmacological Research	2	--
7	0600707	Introduction to Human Genetics and Molecular Biology Techniques	2	--
8	0600708	Principles of Drug Discovery and Development	2	--
9	0600709	Modern Separation and Isolation Methods	2	--

Course Description of General Courses of Master Degree in Pharmaceutical Sciences
(12 cr. h)

First Semester
Core Courses (6 cr. h)

Course Name	Credit hours		Code No.
	L	**P**	
Basics of Research and Ethics	2	--	0600701

Description: This course is designed to promote a deeper understanding of basics and skills that are important throughout students' research career. This course provides the students with the principles of scientific writing and publishing a biomedical manuscript, ethical considerations in publishing (plagiarism, fabrication, falsification, duplicate publication, redundant publication and policies for handling such misconduct), successful drafting of a grant proposal, and reference citations management (e.g. EndNote and Mendeley software). Guidelines for ethical use of animals in research, dealing with human in clinical trials, good laboratory and clinical practice and safety measures of the use of laboratory solvents and chemicals are also discussed.
https://cech.uc.edu/education/programs/educational-studies/phd-in-edst/administration-admissions/core-curriculum.html
University of Cincinnati

Course Name	Credit hours		Code No.
	L	**P**	
Computer Sciences	2	--	0600702

Description: This course provides the students with basic knowledge about the internet, the World Wide Web and introduces basic software and hardware concepts and terminology, as well as, the types of application software. Introduction to algorithms, Java programming language and Python programming languages is also included.
https://pharmacy.osu.edu/computer-lab
The Ohio State University
https://ce.pharmacy.wisc.edu/pd/basic_statistics_and_pharmaceutical_applications/
Division of Pharmacy Professional Development
UW–Madison School of Pharmacy
University of Wisconsin–Madison, Mississippi, United States

Course Name	Credit hours		Code No.
	L	**P**	
Applied Statistics	2	--	0600703

Description: The course provides an introduction to important topics in statistics applied to pharmacy-based research. Emphasis is placed on the types and the appropriate use of statistical analysis of data and their graphical presentations. Practical examples drawn from scientific research are used to illustrate statistical concepts. Students learn different statistical methods using computer-based statistical packages. Various experimental designs and methods for statistical analysis appropriate to the research question, disease, research phase, and therapy under consideration are discussed.

https://www.online.colostate.edu/degrees/applied-statistics/

Colorado State University

https://www.ugr.university/pages/prospective_students/masters_students/masters-programmes/masters-in-applied-statistics

Universidad De Granada- Spain

Second Semester

Elective Courses (6 cr. h)

Course Name	Credit hours		Code No.
	L	**P**	
Advanced Chromatographic Methods of Analysis	2	--	0600704

Description: The course aims to give post-graduates a more specified knowledge on chromatographic techniques that are not covered in undergraduate courses and fundamental aspects of the hyphenation of liquid/gas chromatography (LC and GC) and mass spectrometry (MS) (LC/MS and GC/MS). It also covers the applications of these techniques in pharmaceutical, environmental analysis and drug determination in biological fluids. In addition, the course is designed to familiarize students with data evaluation and interpretation together with performing the validation parameters and performance criteria for an analytical method. Students will be provided with an opportunity to test their methods and compare their validity to compendial or commonly adopted procedures. The course prepares the student to apply the specialized knowledge and integrate them with related knowledge in professional practice.

https://www.wit.ie/courses/type/science/department_of_chemical_life_sciences/postgraduate_certificate_in_advanced_chromatographic_techniques

Course Name	Credit hours		Code No.
	L	P	
Modern Pharmaceutical Research Techniques	2	--	0600705

Description: This course covers modern techniques commonly used in pharmaceutical research. These includes spectroscopic techniques e.g. IR, NMR, and X-Ray and mass to be studied from an applied point of view. Modern microscopical techniques such as confocal, TEM, SEM, fluorescent microscopy and others are taught to explore their utility in research. Thermal analysis (e.g. DSC) and advanced techniques in particle size analysis are also covered. Furthermore, basics of cell culture techniques and manipulations are taught to highlight their usefulness and application in pharmaceutical research.

https://bulletin.ndsu.edu/course-catalog/descriptions/psci/psci.pdf

Course Name	Credit hours		Code No.
	L	P	
Basics of Pharmacological Research	2	--	0600706

Description: The course provides basic knowledge about the concepts of pharmacological studies and sources of errors in screening procedures. It introduces concise up to date comprehensive information about the screening methods of drugs as antihypertensive, anti-inflammatory drugs, psychotropic and neurotropic agents and other commonly used groups of drugs.
 (https://www.postgraduatesearch.com/ucl-university-college-london/56705886/postgraduate-course.htm) University College of London, UK

Course Name	Credit hours		Code No.
	L	P	
Introduction to Human Genetics and Molecular Biology Techniques	2	--	0600707

Description: The course includes basic concepts in human genetics. This course is an introduction to the methods used within Molecular Biology field. The aim of the course is to provide students with a theoretical background to understand key experimental techniques used in modern molecular biology research, a practical experience in some of these methods, as well as skills to analyze and present experimental data, an ability to design relevant experiments and to practice critical evaluation of the data and the conclusions. This course focuses on selected aspects in both basic and applied research.

http://www.hms.harvard.edu/dms/bbs/genetics/curriculum.html
https://www.lunduniversity.lu.se/lubas/i-uoh-lu-BIOR79

Course Name	Credit hours		Code No.
	L	P	
Principle of Drug Discovery and Development	2	--	0600708

Description: The course covers the principles of drug discovery in the areas of development of modern and innovative therapeutic substances as well as natural products. The course covers, in particular, how the chemical structure and physical properties of a drug are related to its biological activity. Factors related to drug development, e.g. biopharmaceutics, pharmacokinetics; and membrane drug transporters are included. Molecular aspects of receptors as targets for drug discovery and drug discovery through enzyme inhibition are also discussed. The drug development pipeline from lead discovery to clinical trials is introduced. Introductory concepts around regulatory affairs, patenting, registration and marketing are covered in the context of new drug discovery.
https://selfservice.mypurdue.purdue.edu/prod/bzwsrch.p_catalog_detail?term=201410andsubject=PHRMandcnbr=46000 University of Purdue, West Lafayette, Indiana, USA

Course Name	Credit hours		Code No.
	L	P	
Modern Separation and Isolation Methods	2	--	0600709

Description: The course addresses full insights of the main chromatographic types and the latest techniques of separation of chemicals from complex matrices. Topics presented include advanced aspects of liquid chromatography (HPLC), thin-layer chromatography and gas chromatography (GC); 2-dimensional chromatography (coupled methods chromatography-chromatography); 'tandem techniques' based on on-line coupling of separation methods and mass spectrometry. Other relevant topics include capillary electromigration separation methods, supercritical fluid chromatography, stereoisomer separation, size exclusion, preparative and medium pressure (flash) chromatography techniques. The course also sheds light on State-of-the-art methods in sample preparation of different types of matrices, providing a guide for choosing the appropriate sample preparation method for a given analysis. Case studies of the application of the different separation techniques for the extraction, isolation and purification of chemicals including, lipids, proteins, carbohydrates and plant secondary metabolites are also presented.
https://www.ntnu.edu/studies/courses/KJ3059/#tab=omEmnet
Norwegian University of Science and Technology