

PHARMACOGENOMICS AND PRECISION MEDICINE

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Course Directors:

Dr. Nanjoo Suh
nsuh@pharmacy.rutgers.edu

Dr. Luca Cartegni
luca.cartegni@pharmacy.rutgers.edu

Course Description: Pharmacogenetics/pharmacogenomics is the study of how an individual's genetic inheritance affects the body's response to drugs. This course will help to understand how genetic differences among the human populations may determine the susceptibility to and onset of human diseases as well as pharmacokinetic/pharmacodynamic responses to drug therapy and how personalized medicine can improve clinical outcome and public health. This course will examine factors that affect drug response, including genetics, environment, diet, age, disease conditions, concurrent drug therapies and health status. Methods and approaches important to pharmacogenomics and precision medicine will be discussed. The overall goal of this course is to provide students an understanding of pharmacogenetics/pharmacogenomics in the context of variability in drug response and the application of pharmacogenomics and precision medicine to drug treatment and drug development/discovery.

Course Objectives:

The student will be able to:

- Understand the mechanisms by which genetic variation impacts drug metabolism and transport.
- Know importance of genetic polymorphism for Phase I and Phase II drug metabolizing enzymes, drug transporters, and/or receptors.
- Recognize how genetic differences in the human population determine individual susceptibility to diseases, response to therapy, and frequency of adverse effects.
- Understand the methodology and approaches used for standard genotyping assays and pharmacogenomics discovery
- Understand how the genetic revolution is fundamentally changing our understanding of how diseases are caused and how humans respond to drugs
- Understand basic principles of personalized and precision medicine
- Recognize the evolving role of pharmacogenomics and precision medicine in drug discovery and development and the knowledge that can be used to provide "rational" drug therapy

LECTURE SCHEDULE

Topic	Instructor
Pharmacogenomics: Overview, Approaches, Analytical Methods and Drug Response Polymorphisms	
Pharmacogenomics and Precision Medicine: an overview	N. Suh
Pharmacogenomics: Methods	S. Chen
Systems Biology/Bioinformatics Approach to Pharmacogenomic Discovery	A. Minden
Pharmacogenomic Approaches in the Treatment of Chronic and Infectious Diseases	H. Zarbl
Polymorphisms in Drug Metabolizing Enzymes and Drug Transporters, Pharmacogenetics and Biomarkers	J. Hong
Pharmacogenomics of Disorders of the Central Nervous System	L. Aleksunes
Polymorphisms in Cancer Drug Metabolism and Efficacy	P. Furmanski
Pharmacogenomics and Precision Medicine: Targeted Therapy, Precision Medicine, Pharmaceutical Development of Pharmacogenomics and Clinical Practice	
Neurodegenerative Disease and the Promise of Antisense Therapies	L. Cartegni
Gene Therapy	R. Zhou
Pharmacogenomics and Precision Therapy in Oncology	L. Cartegni
Targeted Cancer Therapy and Precision Medicine	L. Cartegni
Preclinical and Co-Clinical Drug Development	E. de Stanchina
Implementation of Pharmacogenomics in Clinical Practice	L. Aleksunes