



Exchange programme Vrije Universiteit Amsterdam

Vrije Universiteit Amsterdam - Exchange programme Vrije Universiteit Amsterdam - 2024-2025

Exchange

Vrije Universiteit Amsterdam offers many English-taught courses in a variety of subjects, ranging from arts & culture and social sciences, neurosciences and computer science, to economics and business administration.

The International Office is responsible for course approval and course registration for exchange students. For details about course registration, requirements, credits, semesters and so on, please [visit the exchange programmes webpages](#).

Bioanalyse en Moleculaire Toxicologie

Course Code	XB_0108
Credits	6
Period	P4
Course Level	200
Language Of Tuition	Dutch
Faculty	Faculty of Science
Course Coordinator	dr. K. Jooß MSc
Examiner	dr. K. Jooß MSc
Teaching Staff	dr. ir. J.C. Vos, dr. K. Jooß MSc, dr. S. Moco, dr. A. Wilmes
Teaching method(s)	Lecture, Other, Seminar

Course Objective

BioAnalytical Chemistry and Molecular Toxicology (BAMT) are closely intertwined fields. Molecular toxicology delves into where drugs localize within the body and how they can adversely affect crucial biochemical or physiological processes. Similarly, bioanalytical techniques help answer questions about how the body processes medicine and other foreign substances (xenobiotics). The objective of bioanalysis is to gain theoretical insights into both qualitative and quantitative analysis of chemicals, such as drugs and their metabolites, as well as biological molecules like biomarkers (e.g., low molecular weight endogenous metabolites). These biomarkers can shed light on both desired and undesired effects of medications and disease-related processes. The acquired data are crucial for pharmaceutical toxicology in elucidating how drugs (and other xenobiotics) induce toxic effects. Moreover, molecular toxicology aims to elucidate the process of risk assessment for new (candidate) drugs, employing in-vitro (geno)toxicity assays and alternatives to animal testing,

Course Content

The following topics will be discussed in the course:

- physico-chemical properties of drugs or xenobiotics
- diversity of biological samples in the context of molecular toxicology, including sample preparation and separation methods
- overview of relevant immunoassays, with emphasis on the widely applied enzyme-linked immunosorbent assay (ELISA)
- principles of chromatography, including various (liquid) chromatographic techniques, such as reversed phase liquid chromatography (RPLC) and hydrophilic interaction chromatography (HILIC), commonly employed in metabolomics and toxicology studies.
- basics of mass spectrometry and its hyphenation with chromatography
- application of targeted and non-targeted metabolomics workflows, based on LC-MS and NMR.
- introduction to xenobiotic metabolism and toxicology applications using metabolomics
- introduction to central metabolism and toxicology applications using metabolomics
- basic principles of the (molecular) mechanisms through which (candidate) drugs are metabolized and can cause harmful side effects in the body will be discussed.
- dose-toxicity relationships and risk assessment.
- organ-specific physiology, including expression of drug transporters of major ADME organs (liver, kidney and gastrointestinal tract)
- genotoxicity; carcinogenicity; mechanisms of cell death (apoptosis, necrosis).
- in vitro methods to determine different types of cell toxicity and cellular stress responses.

Additional Information Teaching Methods

Lectures, optional tutorials, group assignment (presentation).

Method of Assessment

The assessment will take place on the basis of a written exam (80% final mark) and a mandatory group assignment (20% final mark). The assignment must be at least 5.0.

Literature

- Lectures, self-study lectures and other study material delivered via Canvas.
- Book: Rang and Dale's Pharmacology.