From Exposure to Effect: The World of Toxicology

Dr Faria Khan
Group 10 and Group 17, ICHF
***Contact**: fkhan@ichf.edu.pl*
***Connect with me for more Qs**: LinkedIn*

Course Description

Explore the fascinating world of toxicology, where science meets safety. This course introduces the principles of toxins, toxicants, and their effects on humans, animals, and the environment. Students will learn how chemicals interact with the body, understand mechanisms of toxicity, and investigate real-world cases from environmental disasters to forensic investigations. Practical skills in exposure assessment, risk evaluation, and lab analysis prepare students for careers in healthcare, research, and public health. Each module covered will be explained with case-studies, news or research articles.

In the end- each one of you would be asked to develop methods/ tools that can help you develop your skills for a career in toxicology!

Outline

- **Introduction to Toxicology (**History and evolution of toxicology**,** definitions, branches of toxicology (environmental, clinical, forensic, regulatory), principles of dose-response and exposure.
- **Toxico-kinetics and Toxico-dynamics** (Absorption, distribution, metabolism, and excretion (ADME), bioavailability and bio-transformation, mechanism of action, target organs, cellular and molecular toxicology)
- **Environmental and Occupational Toxicology (**Exposure assessment in air, water, soil, occupational hazards and industrial chemicals, environmental monitoring and risk assessment. Case studies: industrial pollution)
- **Advanced Topics (**Genetic and epigenetic effects of toxins, endocrine disruptors**,** nanotoxicology**,** computational toxicology and predictive models)
- **Laboratory and Practical Skills (**Sample collection and handling**,** toxicity testing (in vitro and in vivo)**,** data analysis and interpretation**,** case study projects)
- **Risk Assessment and Regulation (**Hazard identification, dose-response assessment, exposure assessment, risk characterization**,** Regulatory toxicology (EPA, FDA, OSHA, REACH)**,** Safety standards and guidelines**,** toxicology in policy and public health)
- **The Toxicologist inside you!** Select one topic that you are passionate about, read a research article on it, identify the methods used in terms of chemical exposure and corresponding study model. You can select any model from computational to zebra-fish to in vitro cells or human epidemiological studies. Select any chemical that you are concerned about: it could be PFAS, flame retardants, wild fire emissions or even plastic! Let the toxicologist inside you address the real-world problems.

This course will be offered in the spring semester starting in February (16th week), 2026.

Registration deadline (1st February 2026)

(The availability of this lecture course depends on whether at least three Warsaw4PhD students are registered.)